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IRON ORE ON LAKE ERIE DOCKS.

SITUATION AS TO STOCKS NOT AS FAVORABLE AS IT WAS A YEAR AGO, BUT CONSUMPTION IS INCREASING AND SURPLUS MAY BE CLEANED UP BEFORE SPRING.

At this time a year ago there was in round numbers 5,500,000 gross tons of iron ore (iron ore is always figured in gross tons) on Lake Erie docks, but it was certain that with the exception of odds and ends and the accumulations of poor stuff brought down years ago, it would be moved to the furnaces before the opening of navigation in 1900. It was nearly all moved. There was only 1,720,656 tons on dock May 1 last.

It is hoped by all interests in iron and steel trades that this same condition will prevail when navigation opens next spring, but the situation at present is not quite as favorable as it was a year ago. All the Lake Erie docks have been heard from and the receipts during the past season foot up 15,797,787 tons, compared with 15,222,187 tons in 1899, while the amount now on dock is 5,904,670 tons, compared with 5,530,283 tons a year ago. The movement of ore from the docks during the past season of navigation was not equal to what it was in 1899. The figures are 11,613,773 tons forwarded to furnaces between May 1 and Dec. 1, 1900, against 11,765,158 tons between May 1 and Dec. 1, 1899, a difference of 151,385 tons. It is, however, a matter of encouragement to note that as a result of increased output in all steel and iron manufacturing lines during the past month, the consumption of ore is now somewhat heavier than it was a month ago, and if this keeps up stocks on the opening of navigation next spring may be reduced to about the figures of May 1 last.

As noted above returns from all the Lake Erie docks show receipts at these docks for the past season of 15,797,787 tons, while the amount on dock with the close of navigation is 5,904,670 tons. As shown by figures presented May 1 last there was on dock at Lake Erie ports at the opening of navigation in 1899, 1,720,656 tons of ore; add to this the receipts during the season just closed 15,797,787 tons, and we have a total of 17,518,443 tons; deduct 5,904,670 tons, the amount now on dock, and we find that the shipments to furnaces between May 1 and Dec. 1, 1900, were 11,613,773 tons, against 11,765,158 tons during the same period in 1899 and 9,059,829 tons during the same period in 1898.

It will be noted that there is a difference of 2,772,528 tons between the water shipments from upper lake ports (18,570,315 tons) and receipts at Lake Erie ports (15,797,787 tons). This difference represents the ore that was moved by water to South Chicago and other points on Lake Michigan. In 1899 the water shipments to South Chicago and points other than Lake Erie ports, aggregated 2,679,171 tons, and in 1897 they were 2,622,467 tons.

Following are the tables showing receipts at Lake Erie ports and amounts on dock during six years past:

IRON ORE ON LAKE ERIE DOCKS, DEC. 1, GROSS TONS.

Ports.	1900	1899	1898	1897	1896	1895
Toledo	242,375	186,422	146,568	194,644	115,959	113,132
Sandusky	95,111	23,184	48,500	84,786	59,491	34,375
Huron	211,377	164,480	139,982	230,029	200,675	101,000
Lorain	251,838	337,822	324,034	317,509	231,288	224,264
Cleveland	1,337,445	1,200,806	1,175,970	1,478,355	1,419,311	1,200,792
Fairport	611,717	692,147	719,794	825,312	773,905	605,470
Ashtabula	1,811,459	1,902,598	1,732,671	1,835,694	1,441,666	1,301,382
Conneaut	630,514	468,808	288,101	360,895	275,800	292,468
Erie	480,734	361,335	439,167	484,871	355,222	335,718
Buffalo	232,100	192,681	121,620	111,660	82,267	207,199
Total	5,904,670	5,530,283	5,136,407	5,923,755	4,954,984	4,415,712

IRON ORE RECEIPTS AT LAKE ERIE PORTS, GROSS TONS.

Ports.	1900	1899	1898	1897	1896	1895
Toledo	645,147	792,348	414,012	416,438	301,794	260,730
Sandusky	154,542	87,499	136,200	79,792	58,667	12,361
Huron	321,914	263,600	126,755	198,231	226,515	146,442
Lorain	1,090,235	1,112,946	536,086	355,188	191,445	214,219
Cleveland	3,376,644	3,222,582	2,645,318	2,456,704	2,313,170	2,312,370
Fairport	1,085,554	1,241,013	912,879	1,008,340	941,446	914,617
Ashtabula	3,709,486	3,341,526	2,684,563	3,001,914	2,272,822	2,474,791
Conneaut	2,556,631	2,320,696	1,404,169	495,327	327,623	244,967
Erie	1,240,715	1,309,961	1,092,364	1,311,526	847,849	811,989
Buffalo, Tonawanda	1,616,919	1,530,016	1,075,975	797,446	545,101	719,742
Total	15,797,787	15,222,187	11,028,321	10,120,906	8,026,432	8,112,228

MORE THAN 25,500,000 TONS.

FREIGHT MOVEMENT TO AND FROM LAKE SUPERIOR DURING THE PAST SEASON OF NAVIGATION—ABOUT FOUR TIMES WHAT IT WAS TWELVE YEARS AGO.

The commerce of Lake Superior, as shown by the army engineer reports of canal traffic at Sault Ste Marie, foots up 25,643,073 tons (2,000 lbs.), against 25,255,810 tons in 1899. The gain is not what was expected, especially when it is understood that in 1899 there was a gain of 4,000,000 tons in round numbers over 1898. Still it is interesting to note that in the past seven years the freight tonnage has been doubled, and it is now four times what it was twelve years ago. The wonderful growth of this traffic is best shown by the following table giving the number of tons of freight moved and the registered tonnage of vessels for fifteen years past:

	Total freight, net tons.	Registered tonnage of vessels.
1900	25,643,073	22,315,834
1899	25,255,810	21,958,347
1898	21,234,664	18,622,754
1897	18,982,755	17,619,933
1896	16,239,061	17,249,418
1895	15,062,580	16,806,781
1894	13,195,850	13,110,366
1893	10,796,572	8,949,754
1892	11,214,333	10,647,203
1891	8,888,759	8,400,685
1890	9,041,213	8,454,435
1889	7,516,022	7,221,935
1888	6,411,423	5,130,659
1887	5,494,649	4,897,598
1886	4,527,759	4,219,397

It will be noted from the following tables that of the total movement of freight through the canals full 80 per cent. was westbound, or down the lakes. It will also be noted that only about 8 per cent. of the total freight passed through the Canadian canal. The full summary of 1900 commerce, as reported by Mr. Joseph Ripley, assistant engineer and general superintendent to Col. G. J. Lydecker, the United States engineer in charge, is as follows:

COMPARATIVE STATEMENT OF LAKE COMMERCE THROUGH CANALS AT SAULT STE. MARIE, MICHIGAN AND ONTARIO, FOR THE SEASONS OF 1899 AND 1900.

Items.	Seasons. 1899	Seasons. 1900	Increase, Per cent.	Decrease, Per cent.
Steamers, number	14,378	14,426	0	
Sails, number	4,776	4,004		16
Unregistered, number	1,101	1,022		7
Total passages, number	20,255	19,452		4
Registered tonnage, net	21,958,347	22,315,834	2	
Freight tonnage, net	25,255,810	25,643,073	2	
Passengers, number	49,082	58,555	19	
Coal, hard, net tons	841,281	515,515		39
Coal, soft, net tons	3,099,896	3,971,462	28	
Flour, barrels	7,114,147	6,760,688		5
Wheat, bushels	58,397,335	40,489,302		31
Grain (other than wheat), bushels	30,000,935	16,174,659		46
Manufactured and pig iron, net tons	214,585	135,585		37
Salt, barrels	316,336	328,895	4	
Copper, net tons	120,090	131,066	9	
Iron ore, net tons	15,328,240	16,443,568	7	
Lumber, M. ft. B. M	1,038,057	909,651		12
Silver ore, net tons	487	110		77
Building stone, net tons	39,063	48,902	25	
General merchandise, net tons	587,484	541,397		8

The United State canal was opened April 19 and closed Dec. 12, 1900; season, 238 days.

The Canadian canal was opened April 23 and closed Dec. 16, 1900; season, 238 days.

STATISTICAL REPORT OF LAKE COMMERCE THROUGH CANALS AT SAULT STE. MARIE, MICHIGAN AND ONTARIO, FOR THE SEASON OF 1900.

EAST BOUND.

Articles.	U. S. canal.	Canadian canal.	Total.
Copper, net tons	126,671	4,395	131,066
Grain, bushels	15,042,161	1,022,064	16,064,225
Building stone, net tons	43,912	4,990	48,902
Flour, barrels	6,123,246	631,630	6,754,876
Iron ore, net tons	15,439,617	1,003,951	16,443,568
Iron, pig, net tons	19,985	90	20,075
Lumber, M. ft. B. M	898,093	11,558	909,651
Silver ore, net tons	110		110
Wheat, bushels	31,325,693	9,163,609	40,489,302
General merchandise, net tons	65,875	20,458	86,333
Passengers, number	16,965	12,233	29,198

WEST BOUND.

Coal, hard, net tons	476,131	39,384	515,515
Coal, soft, net tons	3,488,558	482,904	3,971,462
Flour, barrels	212	5,600	5,812
Grain, bushels	26,084	84,350	110,434
Manufactured iron, net tons	97,101	18,409	115,510
Salt, barrels	318,358	10,537	328,895
General merchandise, net tons	394,885	60,179	455,064
Passengers, number	19,348	10,009	29,357
East bound freight, net tons	19,102,494	1,429,999	20,532,493
West bound freight, net tons	4,504,860	605,720	5,110,580
Total freight, net tons	23,607,354	2,035,719	25,643,073
Vessel passages, number	16,369	3,083	19,452
Registered tonnage, net tons	20,136,782	2,179,052	22,315,834

Note—In addition to the above traffic 15,500 cords of pulp wood and 8,500,000 ft. of pine logs passed over the rapids, bound for lower lake ports.

Secretary Long, Chief Constructor Hichborn, and a number of others interested in the subject, witnessed an interesting test at the navy department last week of the enduring qualities of fire proof wood. To this end samples were selected of the wood of the Winslow, which was the first vessel to be equipped with fireproof wood five years ago. The samples were thrown into a fierce fire and were found to be in as sound condition as when fitted to the boat.

RED STAR LINER VADERLAND.

SHE REACHES NEW YORK ON HER INITIAL TRIP FROM ANTWERP—THREE OTHERS NEARLY LIKE HER WILL SOON BE IN COMMISSION—DESCRIPTION OF THE VESSEL.

The new twin-screw Red Star liner Vaderland, just from the yards of her builders, John Brown & Co. of Clydebank, Glasgow, arrived in New York on Friday last from Antwerp and Southampton after a gallant battle with head gales and seas that proved her one of the worthiest craft launched in recent years. She is intended to be an eight-day boat from Antwerp in pleasant weather and her commander, Capt. Albrecht, says she will be equal to the task cut out for her. There will be three other ships, one a duplicate, and the other two nearly like her, plying on the Antwerp route, chiefly, before the end of another year. One will be the Zeeland, which is under way at Clydebank. The others will be the Kroonland and the Finland. They are being built by the Cramps at Philadelphia. They will fly the American flag. The Zeeland, like the Vaderland, will float the ensign of Great Britain.

The Vaderland is a twin-screw steamer with a length of 580 ft., breadth 60 ft., depth 42 ft., and a gross tonnage of about 12,000. In all departments of construction this vessel is fully up to, and in many cases exceeds, the requirements of Lloyds and the British board of trade, as well as those of the American law. There are eleven water tight bulkheads so arranged that flotation may be maintained with any two compartments filled with water. Special attention has been given to the construction of these bulkheads, which are stiffened in accordance with the requirements of the bulkhead committee of the board of trade. The hold and 'tween decks of the vessel are devoted to the carriage of cargo and stores, with the exception of space amidships comfortably fitted for the firemen, and of a small space aft occupied by stewards. There is cubic capacity sufficient for some 11,000 tons of cargo, and tanks are provided for more than 200 tons of fresh water, in addition to what may be condensed on the route. The storerooms are spacious and well arranged for the large quantities of provisions that will be carried, and include refrigerated chambers for meat and other perishable articles. At the forward end of the saloon deck, which is given up to passenger accommodation, are three compartments for third class passengers—the men's quarters, and at the after part of this deck are the compartments for the women and married third-class passengers, who are berthed in staterooms containing two, four or six berths. These quarters have well-lighted dining rooms. Every compartment has a wide companion-way leading to the houses on the upper deck, which contain the lavatory and sanitary accommodation, and which give access to the promenades on that deck.

INTERIOR FITTINGS ARE BEAUTIFUL IN CHARACTER.

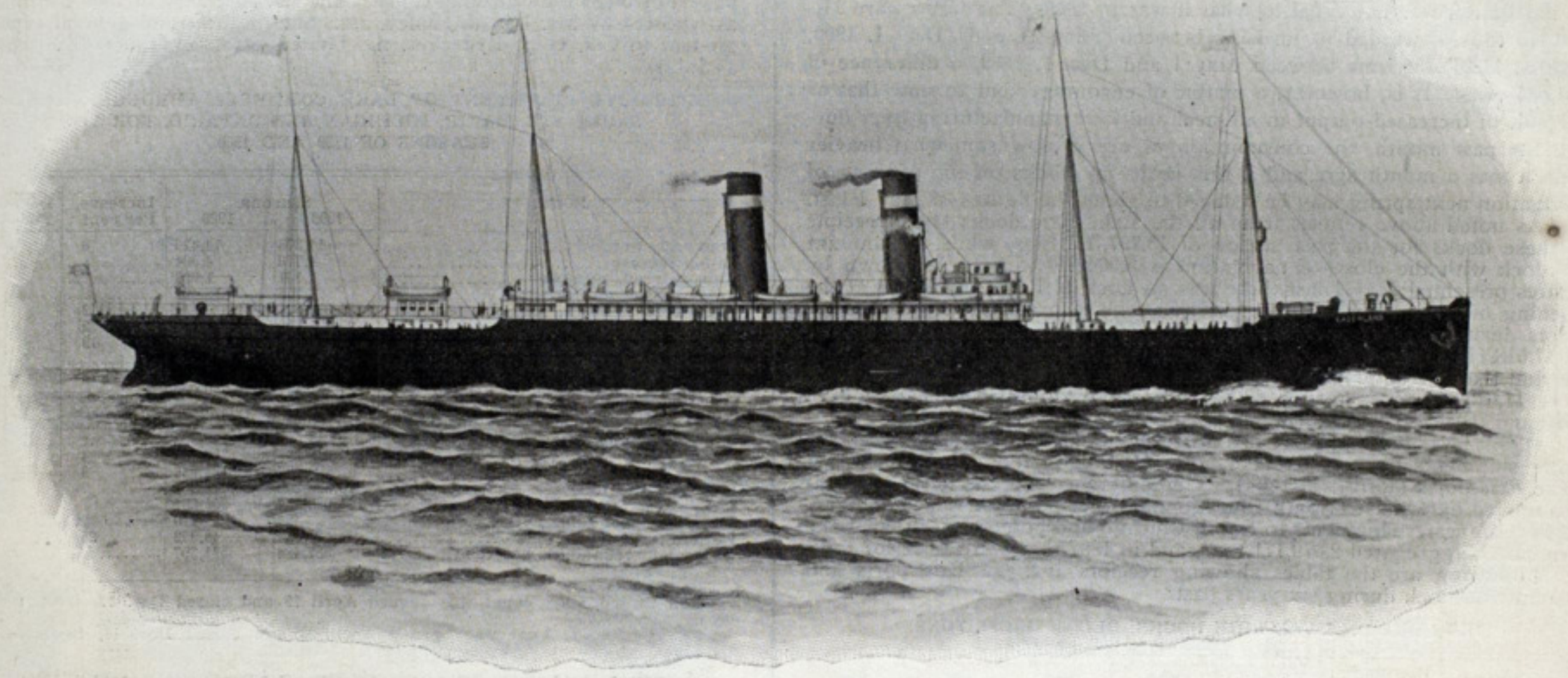
On this deck, amidships, are staterooms for 106 first-class passengers, and the first-class dining saloon, which is situated between the funnels and extends the full breadth of the vessel. It can seat 204 passengers. The woodwork of the first cabin dining saloon is white, enamelled in the Adams style and beautifully enriched, many of the panels containing handsome oil paintings. The furniture is mahogany, except the sideboards, which are of satinwood tastefully inlaid with fancy woods. There is a piano of excellent tone in a case composed of rosewood and satinwood. For lighting and ventilation, in addition to the numerous side lights, there is an unusually large trunk-well extending through two tiers of decks, tastefuly decorated in white and lighted through a richly ornamented glass roof. The seats are covered with a rose-colored moquette, and the upholstery throughout is in excellent keeping with the color scheme of the other decorative materials. Aft of this saloon, and between it and the second-class dining saloon, are situated the galleys, sculleries and pantries, so arranged that ready service can be given to either class of passenger, and fitted with all the best and latest appliances, most of which are of American make.

The second-class dining saloon comes next and also extends the full width of the ship. It can seat 120 passengers and is panelled with tapestry upon a soft cream-white ground. The furniture is in mahogany, and carpets, cushions and curtains are in varying shades of one color, giving a very pleasing effect. There are staterooms for seventy-six second-class passengers aft of this saloon. Coming now to the upper deck and starting forward, there is a long forecastle fitted up for the accommodation of crew and petty officers, with hospitals and lavatories for steerage passengers.

Amidships is a bridge house, some 220 ft. long, with staterooms for 204 first-class passengers at the fore end, and 120 second-class at the after end. These staterooms are large and excellently lighted and ventilated. In a deck house aft is the social room for third-class passengers. The deck above is the promenade deck, which is sheltered by the permanent roof formed by the boat deck. On this promenade deck are situated the first-class library and smoking room as well as suites and special cabins. These rooms are in the deck houses lighted by Mullen's patent rectangular windows with ventilating stained glass panels in the upper part. Almost all the first and second cabin accommodations are located amidships in deck houses, the forward end of which is 192 ft. from the bow and the after end 172 ft. from the stern. This location places the rooms where the motion is least felt, and where the ports may be kept open in almost all weather.

LIBRARY, SMOKING AND LOUNGING ROOMS OF MUCH MAGNIFICENCE.

The library is of large size, 36 ft. wide, and is painted in white enamel with panels of striped silk and silk upholstery. The windows are fitted with cloisonne glass panels which gives a fine effect either by day or night. There is a beautifully designed bookcase in inlaid satinwood, a piano and convenient writing tables. The entrance hall strikes one at once with its spaciousness and the beauty of the rich carving of the doorways. These and the staircase and the panelling are in oak. Comfortable leather couches line the walls and the windows have leaded glass panels. A massive gilt grille gives a grand effect to the skylight over the staircase.



RED STAR LINER VADERLAND.

Aft of the entrance hall are cabins for 32 first-class passengers and also four special suites of cabins each consisting of two rooms, with a lobby between, which communicates with the bath-room. These rooms are so arranged that they can be used either as sitting rooms or bedrooms as desired, and are fitted with small folding tables and other conveniences as well as extension beds. All these rooms open into passages which are continued aft so as to lead under cover to the smoking room, which is situated just aft of the engine casings. Conveniently located on this deck and with a separate stairway to the deck below, are the barber shop, bath and lavatory accommodation for gentlemen. The smoking room panelling is in fumed American oak. The windows and skylight are enriched with leaded antique glass. The seats and cushions are covered with leather, and the floor with rubber tiling, which gives an excellent and comfortable foothold. A well-fitted bar is arranged to serve direct into this room, and tables for card parties with all the usual smokers' conveniences are in evidence. It should also be mentioned that the designing and decoration of the first-class dining saloon, library and smoking room were entrusted to the most prominent firm of decorators in Great Britain, the Messrs. Waring & Gillow of London, Liverpool, Manchester and Paris, and the decorative scheme adopted reflects great credit upon them, as well as upon the builders.

At the after end of the promenade deck, which is reserved for second-class passengers, is a deck-house containing the entrance hall and the ladies' room, the latter being in mahogany with panels of tulip-wood and satin-wood with a brightly painted ceiling. The second-class smoking room is on a detached part of the promenade, reached by gangways. It is much larger than is usual and has rich warm mahogany walls, leather covered seats, and leaded glass panels to side and overhead windows.

There can be carried altogether, 342 first-class, 194 second-class, and about 1,000 third-class passengers. The navigation officers' cabins are placed above the promenade deck and at the fore-end of the boat deck; and above their deck house is the spacious bridge, giving a clear view over the whole vessel and well sheltered by a strong steel bulwark. Part of the boat deck is apportioned as a promenade for the firemen and is fitted with

sheltered seats—a wise and thoughtful provision for their comfort. There are altogether twenty boats, including four patent collapsible ones. The lifeboats are all of steel and are carried in the usual manner under davits. They are of course fitted with patent disengaging gear.

The arrangements for loading and discharging cargo are very complete. There are nine hatches, each having its own winch and derrick with the necessary fittings to ensure rapid handling. The upper deck hatches are fitted with dished steel covers instead of the usual wooden ones, and should be impossible to damage, even in the unlikely event of a heavy sea coming aboard. The winches, windlasses and warping capstans are of American make. Docking and steering telegraph of Chadburn's make have been fitted and the steam steering gear is by Brown Bros., of Edinburgh, and is controlled by telemotor from the wheel house on the navigation bridge. The ship is lighted throughout by electricity, the installation being fitted by the builders as is also a complete system of electric bells. The generating plant is situated in a large room, convenient of access from the engine room, and consists of four dynamos driven by engines by the Sturtevant Co. of Boston. The system of artificial ventilation is also by the Sturtevant Co. of Boston, and it is similar to the systems installed on the St. Louis and St. Paul, where it has met with such unqualified praise by all passengers. Powerful fans exhaust the air from every room and compartment, and fresh air is drawn from the bridge deck, and distributed throughout the passenger accommodations. Fresh air is thus constantly supplied, and in cold weather this air is heated by passing over steam pipes, and the heat supplied may be regulated for each deck independently. By this superior system the inner rooms of the ship are as comfortable as the outer ones, the only difference between them being that the occupants of the outer rooms may get a glimpse of the water from the port holes. This system does away with the necessity of laying steam pipes in every room which is one of the principl causes of what is known as the usual "ship smell."

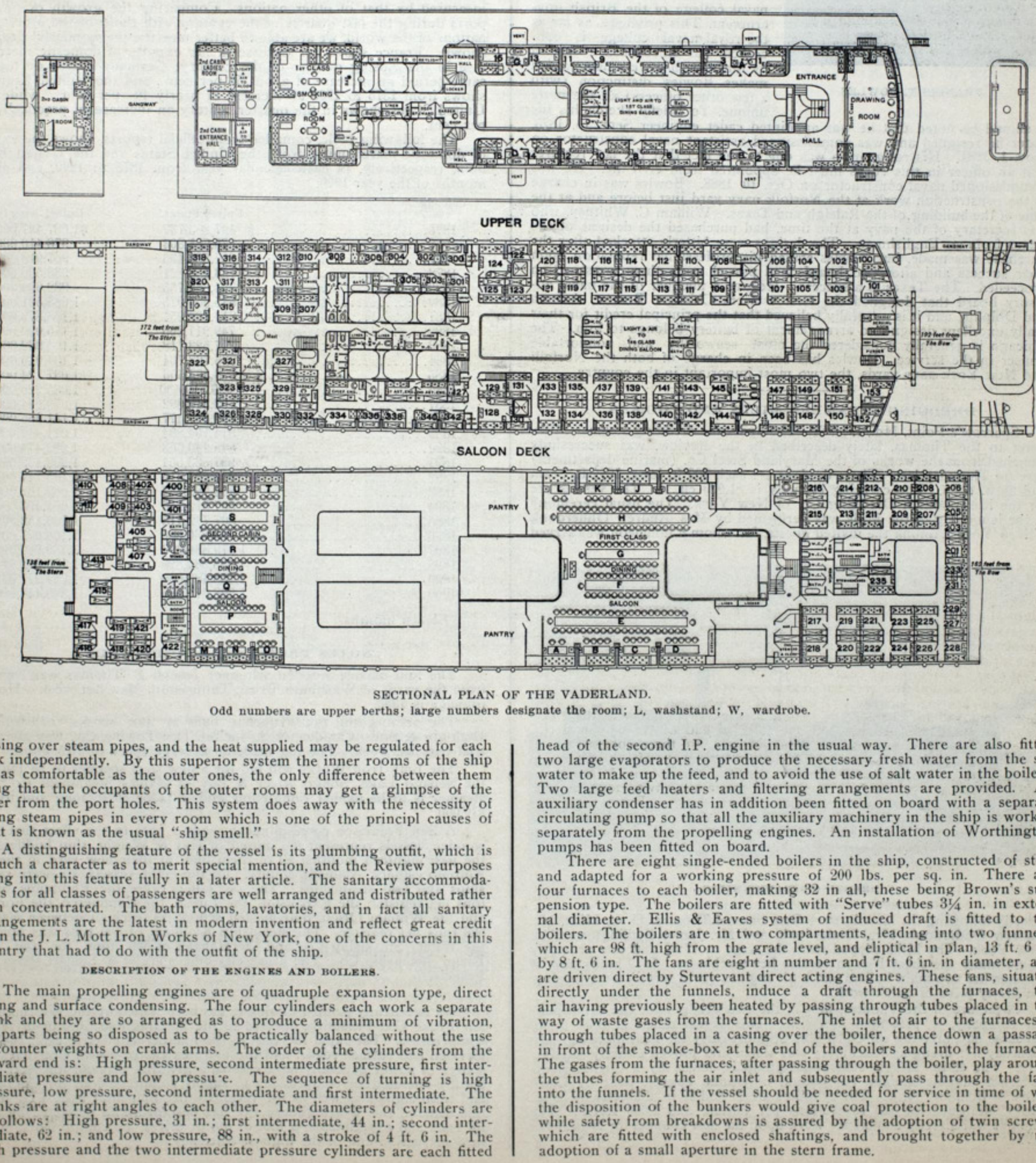
A distinguishing feature of the vessel is its plumbing outfit, which is of such a character as to merit special mention, and the Review purposes going into this feature fully in a later article. The sanitary accommodations for all classes of passengers are well arranged and distributed rather than concentrated. The bath rooms, lavatories, and in fact all sanitary arrangements are the latest in modern invention and reflect great credit upon the J. L. Mott Iron Works of New York, one of the concerns in this country that had to do with the outfit of the ship.

DESCRIPTION OF THE ENGINES AND BOILERS.

The main propelling engines are of quadruple expansion type, direct acting and surface condensing. The four cylinders each work a separate crank and they are so arranged as to produce a minimum of vibration, the parts being so disposed as to be practically balanced without the use of counter weights on crank arms. The order of the cylinders from the forward end is: High pressure, second intermediate pressure, first intermediate pressure and low pressu·e. The sequence of turning is high pressure, low pressure, second intermediate and first intermediate. The cranks are at right angles to each other. The diameters of cylinders are as follows: High pressure, 31 in.; first intermediate, 44 in.; second intermediate, 62 in.; and low pressure, 88 in., with a stroke of 4 ft. 6 in. The high pressure and the two intermediate pressure cylinders are each fitted with piston valves, and the low pressure has two treble-ported flat valves. All the valves are worked by a radial valve gear operated by a single eccentric through a quadrant rocking on trunnions. The reversing is obtained by moving the sliding block attached to the valve spindle from one end of this quadrant to the other. The lap and lead are obtained by a separate lever worked from the cross head of the main engine. This arrangement of valve motion alllows of the valves of the engine being placed at the back, thereby bringing the centers of the cylinders much closer together and economizing space in the engine compartment and, of course, adding to the cargo capacity in the ship. The total length of the engines is about 29 ft., which is much less than could be obtained if the ordinary link gear had been used. The reversing gear is controlled by a direct acting steam engine. The shafting is of Siemens-Martin steel. The four cranks are each built up separately, and are interchangeable. The crank shaft is 17¼ in. in diameter, the thrust shaft 17¼ in., and the tunnel shaft 16½ in. The thrust blocks are of the ordinary horseshoe type, of white metal, and there are eight rings. The blades of the propeller are of Manganese bronze, while the boss is of cast steel.

The condensers are oblong and support the backs of the cylinders. They are of cast iron, and are fitted with brass tubes, the cooling surface being about 7,000 sq. ft. for each condenser. The condensing water to each condenser is circulated by a large centrifugal pump driven by an independent engine, the connections being made between the two condensers. The air pumps are driven by a lever working from the cross head of the second I.P. engine in the usual way. There are also fitted two large evaporators to produce the necessary fresh water from the sea water to make up the feed, and to avoid the use of salt water in the boilers. Two large feed heaters and filtering arrangements are provided. An auxiliary condenser has in addition been fitted on board with a separate circulating pump so that all the auxiliary machinery in the ship is worked separately from the propelling engines. An installation of Worthington pumps has been fitted on board.

There are eight single-ended boilers in the ship, constructed of steel and adapted for a working pressure of 200 lbs. per sq. in. There are four furnaces to each boiler, making 32 in all, these being Brown's suspension type. The boilers are fitted with "Serve" tubes 3¼ in. in external diameter. Ellis & Eaves system of induced draft is fitted to the boilers. The boilers are in two compartments, leading into two funnels, which are 98 ft. high from the grate level, and eliptical in plan, 13 ft. 6 in. by 8 ft. 6 in. The fans are eight in number and 7 ft. 6 in. in diameter, and are driven direct by Sturtevant direct acting engines. These fans, situated directly under the funnels, induce a draft through the furnaces, the air having previously been heated by passing through tubes placed in the way of waste gases from the furnaces. The inlet of air to the furnaces is through tubes placed in a casing over the boiler, thence down a passage in front of the smoke-box at the end of the boilers and into the furnaces. The gases from the furnaces, after passing through the boiler, play around the tubes forming the air inlet and subsequently pass through the fans into the funnels. If the vessel should be needed for service in time of war the disposition of the bunkers would give coal protection to the boilers, while safety from breakdowns is assured by the adoption of twin screws, which are fitted with enclosed shaftings, and brought together by the adoption of a small aperture in the stern frame.

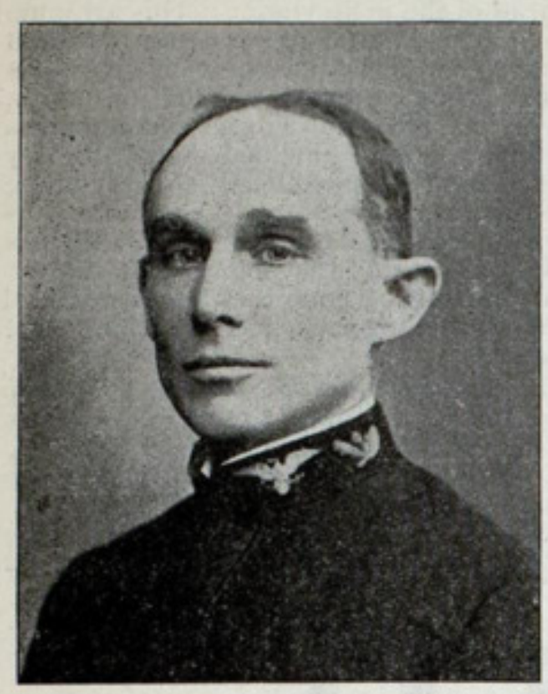


SECTIONAL PLAN OF THE VADERLAND.

Odd numbers are upper berths; large numbers designate the room; L, washstand; W, wardrobe.

FRANCIS T. BOWLES.

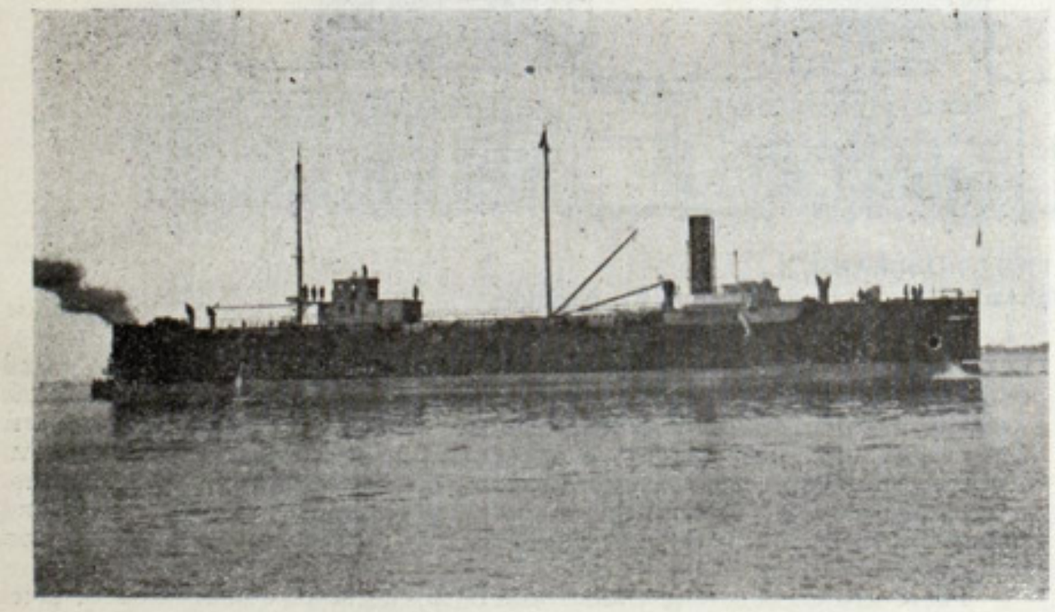
There is no doubt that Francis T. Bowles, who is to succeed Rear Admiral Philip Hichborn as chief constructor of the navy next March, will bring signal abilities to the office. He is full of vim and vigor, a hater of shams, a born fighter and an uncompromising enemy of the politician. He has never permitted political influence to weigh a feather in the navy yards over which he has had jurisdiction. Bowles was heard of in life at an extremely early age and it is not surprising to find him a rear admiral at forty-two years. His mind is an original one, and withal courageous. It was he who suggested the advisability of sending graduates of the naval academy abroad for an advanced course of study in naval architecture. The suggestion was adopted and he was the first to profit by it, passing through the course of naval architecture at the royal naval college of the British government. This privilege, as far as the royal naval college is concerned, has since been abolished by the British government, which makes Bowles' distinction (with a few other officers) all the more unique. To briefly sketch his life it should be noted that he was appointed cadet engineer Sept. 15, 1875. Later he resigned and was commissioned assistant naval constructor on Nov. 1, 1881. His resignation was due to the fact that the law requires that an officer in this corps must be appointed from civil life. He was commissioned naval constructor on Oct. 10, 1888. Bowles was in charge of the construction work at the Norfolk navy yard just before and at the time of the building of the Raleigh and Texas. William C. Whitney, who was secretary of the navy at the time, had purchased the designs of the Texas from an Englishman. The designs were bitterly attacked after the purchase was made, but Bowles staked his professional reputation upon their success and after two boards had passed upon them construction proceeded. The Texas is a success. He was a member of the naval advisory board that designed the steel cruisers Chicago, Boston, Atlanta and Dolphin, and it is generally believed that the principal credit for their really excellent design and arrangement of battery belongs to him. The Chicago is generally considered the most seaworthy and comfortable cruiser in the service. Bowles has been in charge of both the Norfolk and New York navy yards, the two most important in the country.



FRANCIS T. BOWLES.

DREDGING STEAMERS MILLS AND THOMAS.

Sparrow's Point, Md., Dec. 26—The hydraulic dredging steamer Mills, sister to the Thomas, lately described in the Review, was successfully launched from the works of the Maryland Steel Co. (marine department) here on Thursday last. These dredges are each 300 ft. long, 52½ ft. beam and 25 ft. deep. The carrying capacity is 81,000 cu. ft. The vessels are for the Metropolitan Dredging Co. of New York. The usual ceremony in the launching of the Mills was performed by Mrs. Andrew Onderdonk of New York. Among the invited guests, for whom a luncheon was served directly following the launch, were Gen. Samuel Thomas, D. O. Mills, Mr. Andrew Onderdonk, Mrs. Onderdonk, and Mr. James Symington, all of New York. The Mills slipped from the ways at 12:30 and was promptly towed under the shear legs to receive her machinery. In 2 hours and 30 minutes her two main boilers and both engines (twin screw) were in place—a pretty piece of quick work.



DREDGING STEAMER MILLS.

A picture of the Thomas, first of the two dredges for the Metropolitan company, is presented herewith. This vessel sailed at 5:00 p. m. the same day, arriving off Old Point Comfort early the next morning. On Saturday her dredging machinery was tested and proved entirely satisfactory. The 48-in. Morris centrifugal pump is driven by a Corliss shaft-governor, double-tandem, compound, horizontal engine, built by Clark Bros. of Belmont, N. Y. The cylinders are 17 and 30 in. diameter by 36 in. stroke, designed for 125 revolutions per minute and 1,600 I.H.P. The Thomas will directly commence work upon the new channel for New York harbor.

EXPORT TRADE OF THE UNITED STATES.

WE WILL AGAIN LEAD THE WORLD IN 1900—ENGLAND OUR ONLY REAL COMPETITOR—WONDERFUL GAINS IN THE LAST QUARTER OF THE CENTURY.

The United States seems likely to stand at the head of the world's list of exporting nations in the year 1900. One by one the great nations have fallen behind in the race for this distinction until during the past five years only the United Kingdom and the United States could be considered as competitors for the distinction of being the world's greatest exporter of articles of home production. In 1894 the United Kingdom led the United States by nearly $250,000,000, and in 1897 the United States had so rapidly gained that she was but $60,000,000 behind. In 1898 the United States took first place, our exports in that year exceeding those of the United Kingdom by nearly $100,000,000. In 1899 the United Kingdom again stood at the head of the list, her exports exceeding those of the United States by nearly $35,000,000. In the eleven months of 1900 whose figures have been received by the treasury bureau of statistics the domestic exports of the United States exceed those of the United Kingdom by $5,473,670, and should this rate of gain be maintained in December the United States will in the year 1900 show a larger exportation of domestic products than any other nation in the world. Even this distinction, however, of heading the world's list of exporting nations but partially tells the story of the wonderful growth of our export trade as measured by that of other nations. Comparing the growth of our exports during the last quarter of the century with those of the other great nations of the world, we are able to better measure the wonderful progress shown. France shows no increase in her exports of domestic merchandise in the closing quarter of the century; Germany shows during the same period an increase of about 50 per cent., and the United Kingdom shows from 1875 to 1900 an increase of nearly 40 per cent., while the United States shows in the quarter century an increase of practically 200 per cent.

The following table, compiled from official reports, shows the exports of domestic merchandise from the United States and the United Kingdom, respectively, in each calendar year from 1875 to 1899, and eleven months of the year 1900.

Calendar year.	United States.	United Kingdom.
1875	$ 497,263,737	$1,087,497,000
1876	575,735,804	976,410,000
1877	607,566,495	967,913,000
1878	723,286,821	938,500,000
1879	754,656,755	932,090,000
1880	875,564,075	1,085,521,000
1881	814,162,951	1,138,873,000
1882	749,911,309	1,175,099,000
1883	777,523,718	1,166,982,000
1884	733,768,764	1,134,016,000
1885	673,593,506	1,037,124,000
1886	699,519,430	1,035,226,000
1887	703,319,692	1,079,944,000
1888	679,597,477	1,141,365,000
1889	814,154,864	1,211,442,000
1890	845,999,603	1,282,474,000
1891	957,333,551	1,203,169,000
1892	923,237,315	1,105,747,000
1893	854,729,454	1,062,162,000
1894	807,312,116	1,051,193,000
1895	807,742,415	1,100,452,000
1896	986,830,080	1,168,671,000
1897	1,079,834,296	1,139,882,000
1898	1,233,564,828	1,135,642,000
1899	1,253,486,000	1,287,971,039
*1900	1,308,913,789	1,303,440,000

*Eleven months.

NOTES FROM COAST SHIP YARDS.

The four-masted wooden schooner Joseph P. Thomas was launched from the yards of Washburn Bros., Thomaston, Me., last week. Her net tonnage is 1382.

The ocean-going tug Prudence, built at the works of John H. Dialogue & Sons, Camden, N. J., for the Tice Towing Co., was given her trial trip last week. The tug made an average speed of 13.5 knots.

The Bath Iron Works will bid for a new steel steamer to be built for the Sebago Lake, Songo River & Bay of Naples Steamboat Co. The steamer is to be named Longfellow and is to be 80 ft. long and to cost $10,000.

A San Francisco correspondent sends a note to the effect that eight wooden vessels represent the output of Hay & Wright, ship builders, for the past eighteen months, all of them built at their new yard in the San Antonio estuary, Alameda county. Of the eight vessels, six were sailing ships and two steamships. The six sailers were the Philippine of 450 tons net register, the Expansion, the Luzon, the Commerce, the Forester and the William Olsen, four-masted schooners, each of between 500 and 600 tons net register. The steamship Kailulani of 550 tons was built for the Wilder Steamship Co., and the Hanalei of 600 tons for the Inter Island Steamship Co. The firm's city offices are at 36 Steuart street, San Francisco.

An excellently printed catalogue has been issued by the Westinghouse Air Brake Co., Pittsburg, devoted to the Westinghouse motor-driven air compressors. The rapid increase in the number of electric cars, both for elevated and surface roads, and the more extensive use of electricity as a source of power generally have created a growing demand for small electrically-operated air compressors to supply compressed air for car brakes and train signals as well as for various other industrial uses. To supply this demand the Westinghouse Co. has designed, and perfected by careful tests and experiments, a line of motor-driven air compressors, simple in construction and of the highest efficiency.

VESSEL LOSSES DURING 1900.

ANOTHER PROFITABLE YEAR FOR INSURANCE COMPANIES ENGAGED IN BUSINESS ON THE GREAT LAKES—VESSELS LOST ARE NEARLY ALL OF LOW GRADE.

Heavy losses in both cargo and hull insurance on the great lakes three years ago drove American companies almost entirely out of the business. Probably 90 per cent. of the entire insurance of the lakes is now carried in England, and for the past two years these English interests have been very fortunate. Again this year the vessels numbered among the total losses are nearly all of the old wooden kind on which no insurance could be obtained. The insurance interests were also fortunate from another standpoint, in that heavy losses from groundings and collision occurred to vessels of two or three of the very large fleets that carried no insurance. Of course it is understood that the large table on this page, showing the loss in 1900 of forty-seven vessels valued at $534,300 and capable of carrying 27,700 gross tons, has no reference whatever to partial losses or to what are known as constructive total losses, namely, such cases as involve practically an entire loss but which invariably result in the rebuilding of the vessel. The table relates only to vessels that have actually passed out of service. It might be noted, for instance, that the steamer St. Paul and the schooners Sage, J. S. Richards and Narragansett were all what might be called total losses, but they will be rebuilt and are therefore not included in the table. Other summaries, printed herewith, show that there were 613 disasters of all kinds. The following table deals with the total losses during five years past:

LOSSES OF THE GREAT LAKES—VESSELS THAT HAVE ACTUALLY PASSED OUT OF EXISTENCE DURING PAST FIVE YEARS.

Year.	Number.	Capacity gross tons.	Approximate value.
1900	47	27,700	$ 534,300
1899	33	17,955	307,600
1898	64	46,670	1,203,200
1897	35	21,450	372,000
1896	35	21,435	380,500

Capt. T. D. Herriman, surveyor general of the Great Lakes Register, Cleveland, deals with accidents of all kinds in his annual report. He figures that during the season of 1899 there were reported 613 disasters of every description, on the lakes, rivers and harbors from Duluth to Montreal. The locations in which these disasters occurred, are as follows:

Lake Superior, including harbors and rivers	42
St. Marys river, Whitefish point to Detour	46
Lake Michigan and Straits of Mackinac	158
Lake Huron and its bays and rivers	70
St. Clair lake and Detroit river	106
Lake Erie and its harbors and rivers	150
Lake Ontario and harbors on same	29
St. Lawrence river, Kingston to Montreal	12
Total	613

NATURE OF DISASTER.

Damaged by ice	19
Disabled machinery and boilers	83
Stranding in the lakes	107
Grounding in harbors and rivers	138
Collisions with vessels, bridges and docks	162
Foundered	30
Fire	28
Lost sails and otherwise disabled	46
Total	613

The number of disasters in each month was as follows: April, 129; May, 45; June, 75; July, 87; August, 46; September, 102; October, 57; November, 67; December, 5. Total, 613.

ORDERS FOR THIRTY-TWO STEEL SHIPS.

Contracts for six large steel freighters instead of four were closed last week by the American Ship Building Co., bringing the total number of orders up to thirty-two. The order from Mr. Frank H. Peavey, controlling grain elevators at Duluth, for four steamers was made public at once by General Manager James Wallace, but information regarding the other two vessels was withheld. One of them is for Senator McMillan, Mr. Alex McVittie and others who own the steamer Senator. This vessel, an ore and grain carrier, will be a duplicate of the two larger vessels building for J. C. Gilchrist—about 5,000 gross tons capacity, triple expansion engines, Scotch boilers and Howden hot draft. The other steamer is for the Western Transit Co. of Buffalo and will be a package freighter similar to the Starruca—345 ft. over all, 325 ft. keel, 44 ft. beam and 28 ft. deep. She will have quadruple expansion engines with cylinders of 19, 29½, 35 and 58 in., and 48-in. stroke. Steam will be furnished by three Scotch boilers, 11 ft. in diameter and 11½ ft. long, to be allowed 210 lbs. of steam. This vessel will also be fitted with the Howden system of forced draft. The capacity is to be 3,000 tons of package freight and the speed 13 miles.

Two steel steamers building by the American company—one at Chicago and the other at Cleveland—will be launched Saturday. The Chicago vessel is the first of four steamers for lake and ocean service that are known as the Counselman ships. Dimensions are 256 ft. over all, 242 ft. keel, 42 ft. beam and 26 ft. hold. This vessel will be named Northwestern. The vessel to be launched at Cleveland is building for Capt. John Mitchell and others of the Cleveland Steamship Co. and will be named for Walter Scranton, president of the Lackawanna Steamship Co. The Scranton is of about 6,000 gross tons capacity, a duplicate of the steamer Wm. E. Reis.

Announcement is made of another quarterly dividend of 1¾ per cent. to holders of preferred stock of the American Ship Building Co., payable Jan. 15 to stockholders of record at the close of business Jan. 5. Books of transfer close Jan. 5 and are reopened Jan. 16. The company's common stock has been steadily advancing of late, evidently in anticipation of its sharing with the preferred in a dividend at the close of the company's year in July.

Negotiations are pending for the purchase of the plant of the Standard Seamless Tube Co., at Ellwood City, Pa., by the National Tube Co. The chief output of the plant is locomotive and marine boiler tubes. Considerable government work has been done since the plant commenced operations, about four months ago.

VESSEL LOSSES ON THE GREAT LAKES, SEASON OF 1900.—LIST INCLUDES ONLY TOTAL LOSSES, VESSELS THAT ACTUALLY PASSED OUT OF EXISTENCE.

Name of vessel.	Date.	Type.	Cause.	Where.	Capacity, gross tons.	Value Approximate.	Owner.
Brown, Tom	Feb. 20	Tug	Foundered	Near Chicago		$ 4,500	Capt. Wm. Harmon, Chicago.
Halloran, R	May 2	Schooner	Foundered	Off Stannard Rock	1,550	13,000	Corrigan, McKinnie & Co., Cleveland.
Silver Lake	May 28	Schooner	Collision	Off Manitowoc	200	750	Neils Johnson, Racine, Wis.
Parker, Jason	June 11	Schooner	Stranded	So. Manitou Island	200	600	Hans Herwig, Racine, Wis.
Pictou	June 29	Schooner	Foundered	Lake Ontario	300	1,200	Capt. Sidley, Belleville, Ont.
Sardinia	July 6	Schooner	Foundered	Hedgehog Harbor	275	900	Max Pfiel, Milwaukee.
Bauer, John C	July 6	Schooner	Foundered	So. Fox Island	275	1,100	Andrew Nelson, Milwaukee.
Teller, Marion	July 6	Tug	Foundered	Lake St. Clair		4,500	F. Beaubien, Detroit.
Ida	July 9	Steamer	Foundered	Lake Erie	100	800	C. W. Kath, Mt. Clemens, Mich.
Madcap	July 14	Schooner	Foundered	Lake Ontario	200	750	
Fontana	Aug. 3	Schooner	Collision	St. Clair River	2,500	45,000	St. Clair Steamship Co., Cleveland.
Specular	Aug. 22	Steamer	Collision	Pelee passage	2,200	65,000	Republic Iron Co., Cleveland.
Magnet	Sept. 11	Schooner	Foundered	Lake Erie	450	2,000	W. E. Rice, Harbor Beach, Mich.
Dundee	Sept. 11	Schooner	Foundered	Near Cleveland	1,900	50,000	Minch estate, Cleveland.
Lyon, John B	Sept. 11	Schooner	Foundered	Off Conneaut	2,600	65,000	J. C. Gilchrist, Cleveland.
Merritt, T. R	Sept. 11	Schooner	Stranded	Near Oswego	600	5,000	R. O. & A. B. McKay, Hamilton.
Albacore	Sept. 12	Schooner	Stranded	Near Oswego	600	4,000	W. A. Bradshaw, Toronto.
Lulu Beatrice	Sept. 12	Schooner	Stranded	Near Port Burwell	100	1,000	
St. Andrews	Sept. 20	Steamer	Stranded	Lake Superior	1,100	50,000	James Playfair, Midland, Ont.
Martin, John	Sept. 21	Schooner	Collision	St. Clair River	1,700	18,000	Bradley estate, Cleveland.
Dominion	Oct. 2	Steamer	Fire	Detroit River	200	10,000	David Flook, Chatham, Ont.
City of Parry Sound	Oct. 9	Steamer	Fire	Collingwood	600	25,000	Nor. Shore Nav. Co., Collingwood, Ont.
Breck, M. L	Oct. 15	Schooner	Stranded	Near Tobermory	600	4,000	Capt. John McGibbon, Sarnia.
Fabiola	Oct. 21	Schooner	Foundered	Lake Ontario	200	1,500	Capt. Bates, Kingston.
Comet	Oct. 24	Tug	Stranded	Lake Erie		1,000	Henry Brown, Erie, Pa.
Sonsmith, Rosa	Nov. 5	Schooner	Stranded	Near Ashtabula	1,600	18,000	L. P. Mason, E. Saginaw, Mich.
Wells, Fred L	Nov. 5	Schooner	Stranded	Near Oswego	150	1,200	T. Lake, Sackett's Harbor.
Goodell, Edna		Tug	Foundered	Lake Erie		3,000	W. G. Ranney, Cleveland.
Ferry, E. P		Tug				3,000	G. R. King, Duluth.
Davidson, Josie		Tug				3,500	A. S. Hanson, Superior, Wis.
Keating, A. C	Nov. 8	Schooner	Stranded	Whitefish Point	650	3,500	Thos. Currie, Port Huron.
Boaz	Nov. 10	Schooner	Stranded	North Bay, Lake Michigan.	200	500	Chas. S. Burnham, Milwaukee.
Julia	Nov. 10	Schooner	Foundered	Little Sturgeon Bay	100	250	Adam Stevenson, Marinette, Wis.
Finch, Wm	Nov. 10	Schooner	Stranded	Green Bay	100	250	A. Baine, Depere, Wis.
Car Ferry No. 3	Nov. 13	Barge	Foundered	Lake Erie		25,000	Lake Mich. Car Ferry Trans. Co.
Car Ferry No. 4	Nov. 13	Barge	Foundered	Lake Erie		25,000	Lake Mich. Car Ferry Trans. Co.
Card, J. F	Nov. 15	Schooner	Stranded	Near Southampton, Ont	600	3,500	Henry Wineman, Detroit.
Camp, P. H	Nov. 16	Tug	Foundered	Lake Superior		5,000	A. Booth Packing Co.
St. Lawrence	Nov. 21	Schooner	Stranded	Near Lorain	600	3,500	J. H. Baker, Detroit.
Ross, Myrtle M	Nov. 21	Steamer	Foundered	Lake St. Clair	250	5,000	A. W. Nowlin, Dearborn, Mich.
Chicago Board of Trade	Nov. 21	Schooner	Stranded	Lake Erie	850	5,000	Lafe Sullivan, Toledo.
Maumee Valley	Nov. 22	Schooner	Stranded	Pelee passage	500	4,000	Capt. Henry Scanlon, Toledo.
Persia	Nov. 28	Steamer	Fire	Toronto	800	20,000	Toronto & Montreal Steam Nav. Co.
Augusta	Nov. 29	Schooner	Foundered	Lake Ontario	600	3,000	A J. Foster, Toronto.
Higgie, J. F	Dec. 8	Tug	Fire	Detroit		2,500	Hawley Bros., Detroit.
Mills, Mary	Dec. 10	Steamer	Fire	Sturgeon Bay, Wis	300	5,000	Geo. McKenny, Menominee.
Foster, Chas	Dec. 11	Schooner	Foundered	Near Erie	1,950	20,000	James Corrigan, Cleveland.
Number of vessels, 47.					27,700	$534,300	

SHIP BUILDING IN SCOTLAND.

EFFECT OF MATERIAL FROM THE UNITED STATES—ANNUAL OUTPUT OF THE ARMOR WORKS—RETURNS REGARDING NEW SHIPS IN 1900—INTERESTING PRODUCTS OF THE CLYDE.

[From a correspondent at Glasgow.]

The peculiarity of the ship building industry of Scotland at present is that it has recently received a new impetus from America—not, however, in the shape of orders, but by the cheap supply of material. At the beginning of the present year, the great advance in coal sent up the cost of ship plates and other material in Great Britain so high that the orders for new ships fell to a minimum during the spring and summer. Then American plates began to be offered in quantity at such low prices that ship builders were enabled to reduce not only their quotations on specifications put before them, but also to recover some margin on current contracts. During the last three months, the arrivals of American plates on the Clyde have been very large, and although exact figures are difficult to obtain, it is estimated that not less than 200,000 tons of American structural material has been sold on the Clyde this season for delivery over a term of months running into 1901. Whatever the quantity, the effect on prices has been remarkable, for Scotch and English steel ship plates have been rapidly reduced from over £8 to about £7 per ton. It is said that American plates are coming in at less than this figure. But, then, the mere rates per ton do not permit of a true comparison of actual prices. One must know also the terms and the cost of financing before one can compare actual costs. It is sufficient for our purpose to say that the supply of American material has seemed to put new life into Scotch ship building at a time when the dearness of the British material was bringing the industry into a depressed condition. The depression now is in the Scotch iron and steel trades, whereas ship building is active. The output of new ships in 1900 will exceed that of 1899, the banner year, and the new century will be entered with enough work on hand to keep the yards well employed for a twelvemonth.

A large addition to the work on hand has been made by the admiralty orders given recently to three Clyde firms for three large armored cruisers. These three firms are the Fairfield Ship Building & Engineering Co., Ltd., the London & Glasgow Engineering & Ship Building Co., Ltd., and Messrs. Wm. Beardmore & Co., each firm supplying one 14,000-ton heavily armored vessel to steam 23 knots. The last named firm are the successors of the historic firm of Robert Napier & Sons, who may be regarded as the pioneers of steamboat building, and this firm will make the armor for the warship they are to build.

MAKE OF HEAVY STEEL ARMOR IN THE UNITED KINGDOM.

As there has been so much controversy in the United States on the armor question, it may be of interest to state that the make of heavy steel armor in the United Kingdom has been hitherto equal to 40,000 tons per annum, but by the extensions of Messrs. Beardmore & Co. of Glasgow, and of the Armstrong, Whitworth Co. of Newcastle in their Manchester works, the output will in future be much greater. The only other British ship builders who make their own armor plates, as well as their engines, are the Clydebank Co. (now John Brown & Co., Ltd.), Glasgow, and the Vicker's Sons & Maxim Co., Ltd., Barrow-in-Furness. The last named firm recently launched the battleship Mikasa, a vessel of 15,000 tons displacement and 15,000 H.P., which they have built for the Japanese government. This vessel they have armored with Harveyed nickel steel plates of their own manufacture, 9 in. in thickness over a space of 150 ft. amidships, and tapering from 7 in. to 4 in. fore-and-aft, extending 2 ft. 6 in. above and 5 ft. 3 in. below the water line. On the other hand the British armored cruiser Cressy, which has just undergone her official steam trials, was built by the Fairfield Co., Clyde, and is fitted with Beardmore armor of 6-in. carbonized steel, specially hardened. This armor has been found more effective than the old 10-in. plates used in the former armored cruisers of the British navy. The new 23 knot cruisers for which contracts have just been placed (a fourth is to be built by the Armstrong Co., Newcastle-on-Tyne) are to have 4-in. armor plates, specially hardened by the cementation process. Thus a great saving in the weight is effected in the latest type of armored cruisers, as compared with the former type, and a further saving both in weight and space is effected by the adoption of water tube boilers.

With reference to what has been said about American ship building material on the Clyde, it is interesting to note that the Clyde is in turn providing vessels for the International Navigation Co., an American enterprise. This week has been launched from the yard of Messrs. John Brown & Co., Ltd., at Clydebank, a twin-screw steamer (the Zeeland) for the Red Star line from New York to Antwerp. She is a sister ship to the Vaderland, launched by the same builders four months ago, that is to say 560 ft. long between perpendiculars, 60 ft. broad, 42 ft. in depth and of 12,000 tons gross tonnage. There will be capacity for 11,000 tons of cargo, 200 tons of fresh water and 342 first-class, 194 second-class, and 626 third-class and steerage passengers. With a crew of 253, each vessel will carry a population of 1,415. The dining rooms and drawing rooms are very handsomely decorated and fitted up. These boats are not built for high speed, but are intended to combine all the leisure and comfort of a "Greyhound" liner with the freight earning qualities of a cargo carrier. The engines are quadruple expansion, direct acting and surface condensing, with cylinders of 31, 44, 62 and 88 in. diameter and a common stroke of 4 ft. 6 in. Messrs. John Brown & Co., Ltd., Clydebank, are building two other similar vessels for the Southampton and New York service of the same company.

RETURNS FOR NOVEMBER AND FOR ELEVEN MONTHS OF THE YEAR.

Ship builders cannot complain of any scarcity of work as the year draws to a close, however anxious some of them may be as to new contracts to replace those now on their books. More vessels were put into the water by Scotch ship builders in November than in any previous month of a busy year. The total was twenty-eight steamers of 63,420 tons, of which 58,940 tons represented the work of yards on the Clyde, 3,800 from yards on the Forth, and 680 tons from yards at Dundee and Aberdeen. It will be admitted that this is a very large record of work for one month, but of course in passing into the water it is passing away from the schedules of work under construction. Against it Scotch ship builders booked during November contracts to the extent of about 50,000 tons, and since December came in there have been booked about 10,000 tons more. They are therefore pretty much as they were a month ago in the matter of amount of work on hand, but they are certainly disappointed that the liberal reductions in costs during the last few weeks have not brought in a more liberal supply of orders. The fact is that ship builders do not see any necessity for haste in sending out specifications. With the cost tumbling down day by day there is not any possibility of material becoming dearer again in the near future, while there is good reason to expect that it may become cheaper. And the more builders see their order books emptying, as contracts are finished off, the more likely will they be to look kindly on proposals of new business. Still, it is known that the big steamship companies must keep up their fleets and that replenishing orders are now about due from several of them, and it is believed that many "tramp" owners are merely biding their time to order quite a number of highly modernized cargo boats. It is probable also that some considerable foreign orders will be received during the winter, now that costs of building are coming so near to the current market prices for second-hand ships. One thing on which ship builders count for future business is the knowledge of the very large sales this year of second-hand boats by British to foreign owners. There probably never was a year in which transactions were so large—and they were very large last year. These resales have been made at such high prices as to leave the sellers with big profits on their original purchases and their profits as well as the recovered capital they will in due time put into new ships. It is characteristic of the ship owning trade to invest surplus profits in new shipping.

At the beginning of December Scotch ship builders had orders on their books for about 400,000 tons, in addition to vessels already in the water and in various stages of completion in the docks. This does not, of course, include repair work, of which an enormous amount is done every year by Clyde ship builders, and probably is more remunerative than new work. In the eleven months ending Nov. 30th, Scotch ship builders put 461,602 tons of new shipping into the water and this is the largest eleven months' total of launches on record, the corresponding figures for last season being 443,270 tons. The Clyde proportion for the last eleven months was 426,128 tons. Now, as the entire Scotch output for the whole of 1899, the record year, was 491,074 tons, it will be seen that not much pressure during December is necessary to beat the big record. It is indeed not unlikely that the Scotch output for 1900 will be found to exceed half a million tons. To obtain an idea of the magnitude of the industry in this district, one has only to compare these figures with the 207,000 tons or so which formed the output of the whole of the United States in 1899. Recent returns give the tonnage on hand in the other three leading ship building centers of Great Britain as follows: Tyne, 228,000 tons; Lear, 162,000 tons; Hartlepool, 94,000 tons; total, 484,000 tons. Thus Scotland (which means practically the Clyde, as the outputs of the Forth, the Tay and the Dee ship yards are comparatively small) is equal to the great producing districts of England put together.

The admiralty contracts for three big armored cruisers given to Clyde ship builders were accounted amongst October bookings. All of November contracts are for merchant tonnage. They include four big cargo boats for the South African service of the Union-Castle line, two each to be built by Messrs. Barclay, Curle & Co. and Messrs. William Beardmore & Co., respectively; two cargo boats of 1,500 tons each to be built by Messrs. Scott & Co., Greenock, for local owners; a steamer of 9,000 tons burden to be built by Messrs. Charles Connell & Co., Glasgow, for the Asiatic Steam Navigation Co.; a goods and passenger steamer of 3,500 tons to be built by the Campbelltown Ship Building Co. for the Union Steamship Co. of New Zealand; a cargo boat of 2,350 tons to be built by the Grangemouth & Greenock Ship Building Co. for Norwegian owners; and two cargo boats of 1,850 tons and 2,500 tons respectively, to be built by Ramage & Ferguson of Leith for local owners. The more recent bookings include a big twin-screw Allan liner for the Liverpool & Montreal trade and a couple of Clan liners for the eastern trade.

The launches of the month include the second of four 12,000-ton cargo and passenger steamers ordered by the International Navigation Co. for their Antwerp and New York and Southampton and New York services from Messrs. John Brown & Co., Ltd. Another product of the month was a twin-screw Peninsular and Oriental liner, built by Messrs. Caird & Co., Greenock, who seem to be builders-in-ordinary to the P. & O. Co., for whom they have always work on hand. Yet another was a 6,300-ton boat built by Messrs. D. & W. Henderson & Co. for the eastern service of the Anchor line; and still another was the 4,000-ton boat built by Messrs. D. J. Dunlop & Co., Port Glasgow, for the Woermann line of Hamburg. Of the launches 7,800 tons were for Germany, 7,350 tons for Austria, 1,830 tons for Spain, and the rest for Great Britain and the British colonies.

One hears a great deal about the development of ship building in Germany. Nevertheless British builders launched for German owners last year 68,000 tons of new vessels and British ship owners sold to Germans 65,500 tons of second-hand vessels. At the beginning of the last quarter of the ship building year some 80,000 tons of new ships were under construction in British yards for German owners. Among these were two vessels built by Messrs. David J. Dunlop & Co., Port Glasgow, for the Woermann line of Hamburg, viz., the Ernst Woermann and the Hans Woermann. The former was launched a little while ago, and the latter this week. They are sister ships, 340 ft. long between perpendiculars, 44 ft. in breadth and 29 ft. in depth, main deck. They are engined with triple expansion engines of 24, 38 and 63 in. diameter and a common stroke of 42 in.

A FEW OF THE PRINCIPAL NEW VESSELS.

A new Anchor liner was launched recently by Messrs. D. & W. Henderson & Co., Ltd., at their Meadowside yard, Glasgow. This firm has built nearly all the Anchor liners, and also yachts famous in the Anglo-American contests—the Thistle and the three Valkyries. They are also to build the new challenger for America's cup, Shamrock II. The new anchor liner is named Assyria and is for the Indian, not the transatlatic service of the company. She is to be followed by the Nurindia. Both are vessels of 13,000 tons cubic capacity, 470 ft. by 55 ft. by 33 ft., with triple expansion engines of 29½, 47 and 78 in. cylinders. These vessels, besides having fine accommodations for passengers, are fitted with all the latest appliances for the working of cargo. Yet another recent interesting product of Clyde yards is the Port Morant, built by Messrs. Alexander Stephen &

Sons, Linthouse, near Glasgow, for the new West Indian fruit and mail line, inaugurated by Messrs. Elder, Dempster & Co., Liverpool, under an arrangement with the Colonial office. The Port Morant has more the cut of a yacht than we have grown accustomed to in ocean steamers. She is 320 ft. in length by 40 ft. in breadth and 28 ft. in depth and has luxurious accommodation for forty first-class and sixteen second-class passengers. She is, however, chiefly notable for the special refrigerating, ventilating and storing arrangements for the conveyance of fresh fruit from Jamaica to the British markets. What is henceforward to be known as the "Imperial Direct Inert Indian Mail" service will consist of four specially designed twin-screw steamers. The Port Royal has been launched by, and the Port Antonia is being built by, Messrs. Raylton, Dixon & Co., Ltd., Middlesboro-on-Tees, and the Port Maria is being built by Messrs. Ramage & Ferguson, Leith, and the Port Morant has just been launched by Messrs. A. Stephen & Sons, Glasgow. The run is to be between Jamaica and Bristol, and besides the interest of the expectations of a new trade designed to benefit the colony as well as to give the people of the mother country an ample and cheap supply of bananas and other tropical fruit, the venture has interest in restoring an old and historic connection between Bristol and the West Indies. The idea of starting a line of steamers for this special trade first took shape in Glasgow, but it fell into the wrong hands and did not succeed there in attracting the necessary capital. Therefore it was taken up by Messrs. Elder, Dempster & Co., Liverpool, who have done a great deal to develop the fruit trade in connection with their West African lines of steamers. The connection between Glasgow and the West Indies, however, is a very old and close one, especially with Demerara and Trinidad, where a large proportion of the capital in sugar estates is Scotch. Until German and French bounties on beet strangled the cane sugar trade, one of the most prosperous industries of Glasgow was the making of sugar machinery for the West Indies.

It is reported that the great concern of Harland & Wolff, Belfast, builders of the Oceanic, and most, if not all, of the White Star line ships, is about to be converted into a limited liability company. It is not expected, however, that many of the shares will be offered for public subscription.

CONTRACTS FOR THE BATTLESHIPS AND ARMORED CRUISERS.

The board of construction has recommended to the secretary of the navy that contracts for the new warships, for which bids were opened a short time ago, be distributed as follows:

Cramp & Sons of Philadelphia, one unsheathed armored cruiser at $3,730,000, one sheathed armored cruiser at $3,890,000, and one sheathed battleship at $3,780,000; Newport News Ship Building & Dry Dock Co. of Newport News, Va., one unsheathed armored cruiser at $3,885,000, one sheathed armored cruiser at $3,775,000 and one sheathed battleship at $3,598,000; the Union Iron Works of San Francisco, one sheathed armored cruiser at $3,800,000 and one unsheathed armored cruiser at $3,750,000; the Fore River Engine Co. of Quincy, Mass., two unsheathed battleships at $3,405,000 each, and the Bath Iron Works of Bath, Me., one sheathed battleship at $3,590,000.

Several of these bids are conditional. Some of the bidders eliminated from their proposals the cost of electrical plant and coaling apparatus, and the board recommends that the price of these things be included in the bids submitted. Another and more important recommendation is that firms whose bids were outside the limit of cost set by congress for the ships must reduce their proposals to the size of the lowest bid in the class of vessels concerned. Should any of the firms decline to accept those conditions it will be necessary for the board to make new recommendations. The board decided that the law did not require awards for three vessels to be made to Pacific coast firms. It was determined also that the bids of the Moran Bros. Co. of Seattle were too high and that the only vessels to be built on the Pacific coast should go to the Union Iron Works.

BIDS FOR THREE PROTECTED CRUISERS.

A Washington dispatch announces that there will be lively competition among the various ship builders to secure contracts for building the protected cruisers, of which three are authorized. The competition will not, however, be as lively as it was for the battleships and armored cruisers, as certain of the firms which are amply able to build battleships refrained from entering the competition on being given a fairly free field for the protected cruisers. The limit of cost of the three protected cruisers is $2,800,000, of which the sum of $250,000 has been deducted to cover articles to be supplied by the government, including the armor. The vessels designed by the board of construction are to be of 9,600 tons displacement, and it is feared that the bids will not be within the limit of cost. Immediately after the receipt of the bids, in case they should be higher than the appropriation made by congress, Secretary Long proposes to ask for additional money.

One of the projected protected cruisers will certainly go to the Pacific coast. It is understood that the Moran Bros. Co. of Seattle, who were unsuccessful in the competition for the battleships and armored cruisers, will be among the Pacific coast bidders. The disposition on the part of the board of construction is to favor this firm, and other things being equal it will probably be awarded a protected cruiser contract.

PROSPECTUS DEALING WITH CRAMP CONSOLIDATION.

A London dispatch, credited to the Financial News, says that a prospectus for a scheme for the consolidation of the English firm of Vicker's Sons & Maxim and the American firm of Cramps is being circulated privately. The title of the new concern is to be Cramp, Vickers & Maxim & Midvale. The capital is to be $20,000,000, half in ordinary shares and one-half in 6 per cent. preferred. The ordinary shares will be taken by Vicker's Sons & Maxim, and the others by the venders. The company will acquire the Vickers-Maxims patents for manufacturing guns in America. The only stock to be offered to the public is $10,000,000 in 4½ per cent. debentures payable in gold, part of this reserved for the United States.

AMERICAN AGGRESSION AND BRITISH HOPEFULNESS.

The Iron Trade Circular of Birmingham, England, contains the following account of American invasion and likewise a note of encouragement for British iron and steel manufacturers:

"We stated the position of the market last week to be puzzling, and puzzling it continues. We, however, think things are brighter, not as regards orders placed, but things appear to be blending more in favor of makers. In the first place coal is nothing like so strong as it was. This is clearly proved by the admiralty contracts for something like 250,000 tons of steam coal just placed at prices ranging from 20s. 3d. to 21s. per ton, and we understand all prices exceeding 21s. per ton were rejected. The last admiralty contracts ranged from any figures from 25s. per ton to 30s. per ton. Outside government contracts prices are doubtless weaker and colliery agents are anxious to book orders. Merchants are booking orders at a price not considering their stocks. Unload appears to be the ambition of coal owners and merchants, which shows the way the wind blows. If consumers of coal will only hold off the market, and, when obliged to order, order small lots only, we are convinced that we shall soon see prices of coal at a reasonable level. Coke, as we stated in our last issue, is down considerably, but not sufficient to enable ironmasters to restart the furnaces they have recently blown out. Iron ore is cheaper somewhat, and, last but not least, manufacturers have commenced to carve the wages bill, as the Welsh steel makers and workmen's representatives have jointly agreed to discontinue the payment of the 10 per cent. advance on the standard wages rate conceded recently. We are truly glad to see this. It is the only way to resist American competition. To talk about the men refusing to work American iron and steel is a weak policy; in fact it is a 'dog in the manger' policy, which never pays. Fight your enemy on fair ground and with fair weapons and give honor to those that win in fair fight. We are convinced that America, with all her natural resources, can not do British makers a great deal of harm in the home market if only they will once make up their minds to resist the invasion. We have sold, and can again sell, heavy steel rails at £4 10s. We certainly do not want to do it, but it is certain Americans will not make huge fortunes out of British firms.

"We are glad to announce that we are receiving better reports from America. America is no doubt now, as regards iron and steel, the barometer of the trade of the world. They are a venturesome and energetic race, but we often think their bark is more than their bite. 'Lick creation' is an old American saying, and do it they will if only in words. Mind, we are not making light of American competition—far from it; in fact, as regards pig iron, billets and crude material, we know too well it is no bogey, but as regards finished material we think our 'Yankee' friends will not, as before said, make much out of the British. What can they do now when we are selling steel rails at £6 per ton and under for good lines. We have also now Welsh billets at £5 10s. Our American friends have been trying to force a few sales in ship plates, but now British makers have come down to £7 per ton we think this should be a checkmate in this specification. We certainly heard this week of American bars, delivered in South Staffordshire, at £7 5s., but in this case consumers have to take their risk as to quality and delivery. Our American friends guarantee delivery in ten days, but how often have we heard this tale? To show the inconsistency of American firms, we may mention that this week a firm in South Staffordshire, which sent a good order to America for bars last May, has cancelled the same this week, as they have not received an ounce of iron, notwithstanding their frequent applications for the same. Again, we know of a lot of iron that came from America and turned out to be absolutely useless, even for nut making. This lot found its way to the scrap heap. Thus it is not always wise to buy cheap stuff, and British consumers 'once bit will be twice shy.' If only we can get coal, raw material, and wages to a reasonable level we shall still defy 'Mr. Yankee,' notwithstanding his pet proverb, 'lick creation.' Loud talk is one of their weaknesses.

"In our ambition to resist American invasions we must not neglect other competitors. Keep an eye on Belgium. Don't forget we have in our midst agents offering bars and nail rods, delivered in South Staffordshire, at £6 15s., tees at £7 2s. 6d., angles at £6 17s. 6d., joists at £6 10s. On the week our own market shows but few changes as regards value. North of England iron and steel ship plates and angles are down at £7 to £7 2s. 6d. The Welsh firms have made another effort to resist American competition by reducing Bessemer billets to £5 10s. In the Midlands sheets are weaker at £8 15s. for black doubles at works, and £12 for galvanized corrugated 24-gauge, delivered in Liverpool. Better brands, of course, fetch more money."

NEW SCHOONER YACHT.

What will be one of the finest schooner yachts ever built in this country is being constructed at Shooters' island, in the lower harbor of New York. The boat, which is to be used for off-shore cruising, is for Robert E. Tod of the New York, Atlantic and other yacht clubs. Mr. Tod has been contemplating having a boat built ever since he sold the Katrina early in the year, and he had H. C. Wintringham draw plans embodying his own ideas of what ought to make an ideal cruiser. He wanted a big boat, one in which he could go anywhere, with good accommodation and without an enormous racing rig. Wintringham was so successful with his designs that Mr. Tod ordered the boat to be built at once, and the contract was placed with the Townsend & Downey Ship Building & Repair Co. The new yacht will be a handsome addition to the yacht squadron of this country, and if Mr. Tod should cruise abroad, as he undoubtedly will, it will show foreign yachtsmen what American designers and builders can do. The hull of the craft is to be of steel. The model is a graceful one and shows power. On the water line the length is 110 ft, and from stem head to taffrail the length will be 152 ft. 4 in. Wintringham has given to the yacht a clipper bow, which is the best type for boats to be used on the deep sea. Then the keel line runs in an easy curve to the rudder post, where the draught will be 14 ft. The forward overhang is to be 18 ft. 8 in. and the after overhang 23 ft. 8 in. The extreme beam is 28 ft. The yacht will have a poop deck, which will give plenty of head room in the after part as well as giving the man at the wheel an unobstructed view of the boat.

Another yacht is being built by James Bayles & Son at Port Jefferson. She will be of wood, and is to be 130 ft. over all, 108 ft. on the water line, 18 ft. beam and 7 ft. draught.

MARINE REVIEW

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The framing of the river and harbor bill at each succeeding congress is a prodigious task. From a comparatively simple and insignificant measure it has become one of the most complex and important in congress. The river and harbor bill has grown with the country. To have a hand in the framing of this bill is to have enough to do. Nothing illustrates better the absorbing character of a congressman's duties than a post upon this committee. The time is not long since when three months in the year comprised the limit of a congressman's active service. For the balance of the year he was either a gentleman of leisure or devoted to his profession. Nowadays if a person wants to be more than a polywog in congress he has to work all the year round. If one has a profession he must abandon it. He cannot attend to both. Prominence in congressional life is no sinecure. It's work, work, work from daylight until dark. One would naturally suppose that at the end of a congressional session the representative might have ease. If he has it is because his district is of little account. If his district is an active one he is busy every moment he is at home. The river and harbor bill to be presented to the house after the holiday recess carries with it an appropriation of $60,000,000 and every dollar of that appropriation has meant toil for some one. The chairman of the committee has to be as familiar with the needs of a waterway as is the person who makes the demand for an appropriation for it. As a matter of fact he must be more familiar with it. Water does not rise beyond its source and the average congressman does not hold his head higher than his district. The chairman of the committee is really the representative of the entire country and he must see to it that the district-representative does not exact too large an appropriation for his own town—a weakness to which he is prone and which, if not closely watched, would swell the bill out of all proportion. The chairmanship of this committee is both a difficult and delicate position to hold. Mr. Burton has done well in this place. The chain of great lakes has not as much as was expected but has a great deal. All the most important and most pressing things are cared for. Cleveland gets a total appropriation of $2,925,000, of which $600,000 is in cash for immediate work in widening and improving the entrance to the harbor and for the extension of the east breakwater. The remainder is to be appropriated under the continuing contract plan. In all the sum of $6,675,400 is appropriated for Michigan rivers and harbors. The connecting rivers of the lake system are to be well provided for. The sum of $500,000 is appropriated for continuing the work of deepening the channel in the lower part of the Detroit river at the Lime-Kiln crossing. Two important pieces of work are also outlined. One is the west Neebish channel in the St. Mary's river and the other is a second Lake St. Clair canal. The appropriation for the west Neebish channel is $4,000,000, of which $500,000 is immediately available. The appropriation for the flats canal is $330,000. By the west Neebish channel is meant the removal of the shoals between the Sault canal and the upper entrance to Hay lake so as to give a width of at least 1,000 ft.; then the provision of a new outlet for the channel of Hay lake to Mud lake via the west Neebish giving at least a width of 300 ft.; and to deepen the old channel between Hay lake and Mud lake, via middle Neebish to 21 ft. By having two channels through the swift Neebish, one for up-bound and the other for down-bound boats, the dangers of collisions will be minimized.

A representative of one of the Atlantic coast ship yards says in a letter to the Review: "Clyde ship builders have contracted for 150,000 tons of ship steel with American steel manufacturers, who are to deliver at Glasgow at a cost of $250,000 below the price asked by British makers. The present duty on steel is a farce. It is absurd and should be repealed. A great American ironmaster boasted two years ago of his ability to deliver steel at any American ship yard at a price much below that asked by British makers delivering at British yards. Within six months the same manufacturer has charged £18-7-6 per ton for ship steel delivered in New York, whereas British makers were selling at £17-17-6 per ton. An American steel manufacturing company delivered certain grades of steel in Britain at 9 cents per pound while charging American ship builders over twice that amount. American ship builders can never compete with European builders while such a state of affairs exists. What we want is stability in our steel market, and the best way to produce such evenness of quotations is to repeal the present duty on imported steel."

SENATOR HANNA DISCUSSES THE SHIPPING BILL.

Discussing the shipping bill since his return to Cleveland, Senator Hanna says:

"There was no lobby at Philadelphia, so far as I know, working in the interest of the shipping bill. The only lobby that I ever heard of is the one at work in the interest of the foreign steamship lines, that, of course, are interested in the measure's defeat. At the St. Louis convention, and again at Philadelphia, there was a plank in the Republican platform, which was adopted, recommending measures which would build up the merchant marine. In every message that the president wrote since he has been president, he has strongly urged such a measure. It is absurd to claim there was a bill named, my bill or any other man's bill. That is out of the question, for the bill is a matter which belongs to congress alone, and is the carrying out of platform promises.

"During the three years which this measure has been in process of formation I will venture to say it has been amended twenty times. There has been the greatest spirit of fairness, and nothing but the greatest desire to evolve a measure which will be just and fair, and fully carry out the design of those who introduced a plank in the platform to build up and encourage American shipping. We first considered differential duties, such as were provided for by the first congress. Others suggested the paying of bounties on exports, but upon investigating this phase of the matter it was found such procedure would violate thirty-four treaties now in force with foreign powers. Under the favored-nation clause of those treaties, were we to revert to the bounty system, we would have to pay the same duties to them or abrogate and destroy the treaties. It was not thought best to disturb our relations with those countries, which are the largest consumers of our export products. Therefore the only possible way left of succeeding in the desired purpose was to pay a direct subsidy, and the bill now under consideration has been so constructed as to overcome all difficulties and secure the greatest results.

"The effect of the passage of this bill will be immediate and lasting in its results. We are seeking by it to lay the foundation for increased trade in Europe and the Orient. I have information of several projected lines which will become immediate factors in the world's commerce directly after its passage. One line will be put on to the Mediterranean and the Black sea, reaching Russia at the port of Odessa. Two lines will be put on reaching South American ports. Our present lines to Australia will at once be increased in effectiveness, and additional ships placed in commission for the oriental trade. If we ever get to a vote in the senate, the bill will pass that portion of the congress, and it will go through on its merits alone. There is considerable opposition to the bill from men who do not understand it and its effect on shipping. Let them read what Senator Frye has to say, and my speech, and then they will be wiser."

TORPEDO BOAT MACDONOUGH LAUNCHED.

The torpedo boat Macdonough was successfully launched at the yards of the Fore River Engine Co., Weymouth, Mass., on Monday. An effort was made to launch her on Saturday but the grease froze on the ways. The boat will shortly have a builders' trial over the Cape Ann course. The Macdonough has excited much interest among naval men because she is one of a new type. Her dimensions are: Length 242 ft.; beam 22 ft.; depth from deck to keel, 14 ft.; draught, 6 ft., 8 in. No part of the vessel is armored save the forward conning towers, which are covered with ¾-in. nickel steel. The engines are only protected by the coal bunkers, which extend for 100 ft. amidships on either side, and which have a capacity for 150 tons of coal, sufficient to provide a speed of 14 miles an hour for 4,000 miles. The outer hull is of ½-in. steel plates. This shell would be pierced if struck by a projectile. The vessel, however, is built with twelve separate water-tight compartments. There are two conning towers. Accommodations are provided for a crew of eighty officers and men. The ship presents the innovation of having the officers' quarters forward and those of the crew aft. Underneath the living deck and forward of the boilers is a water-tight deck.

A clever device of the Macdonough is an arrangement of telescopic masts mounted on the forward bridge, to which the searchlight is fixed. These masts can be shot up in a second, and as quickly lowered. The armament of the Macdonough will consist of four 14-pounder 3-in. rapid-fire guns and three 6-pounders. The 14-pounders will be placed one on top of the forward tower and three on the center line of the vessel. One 6-pounder will be located on each side of the forward tower and the other will be on the after bridge. The two 18-in. torpedo tubes are located in the stern, one forward and one aft of the after conning tower. The after one will be used to discharge the torpedo when the vessel is swinging away from the object of attack and the forward one will be more for a broadside fire. Two spare torpedoes will be stored in water-tight cases with water-tight covers, one on each side of the deck, located so that they can be lifted by cranes to the torpedo tubes directly from the cases.

SIZE OF LEAGUE ISLAND DRY DOCK.

Rear Admiral Endicott, chief of the bureau of yards and docks, has received the report of the special board, headed by Com. George A. Converse, which was appointed to look into certain disagreements between the contractors and the navy department concerning the construction of the League Island dock. The dock was to be built originally of timber, but later it was decided to construct a stone dock in its stead. The contractor complained that more money was needed for this reconstruction than the department was willing to allow. The board, in its report, recommends, in round numbers, an increase of $350,000 for the building of the stone concrete dock, this still being within the limit of cost allowed in the appropriation. The board also recommends that the dock shall retain its original size, and not be enlarged. Admiral Endicott has so far taken no action.

The navy department has issued an order changing the official designation of the League Island navy yard from "navy yard, League Island, Pa.," to "navy yard, Philadelphia, Pa."

The Pan-American Steamship Co. was incorporated in New Jersey on Saturday last with a capital of $5,000,000. The new company will be operated in connection with the International Express Co., of which Edward C. O'Brien is the president.

LEWIS NIXON, SHIP BUILDER.

A SKETCH OF HIS REMARKABLE ATTAINMENTS AND WHAT HE HAS DONE WITH HIS THIRTY-NINE YEARS.

The New York Herald contains the following sketch of Lewis Nixon, the ship builder, who has latterly become quite prominent in public affairs in New York:

And so it is safe to say that Lewis Nixon is one of the most interesting and potent personalities in Greater New York today. Mr. Nixon has probably crowded more of successful attainment into thirty-nine years by reason of his brains and force of character than almost any other man in the country. Graduated at the head of his class at Annapolis when placed in competition with picked men from all parts of the union, he was sent abroad by the navy department to take an advanced course in naval architecture, engineering and ordnance at the world's greatest engineering school, the Royal Naval College of England, where the flower of the English navy are educated. He was graduated at this college, and during the three years he was in Europe was ordered to inspect the dock yards, armor plants and gun shops of England and France. And thus he laid the foundation of that knowledge and judgment which a few years later enabled him to perform signal service to his country by designing in ninety days the vessel which of all our navy is nearest to the hearts of the American people, the battleship Oregon, and her sister ships, the Indiana and Massachusetts. This to his credit alone would be sufficient to have made or spoiled many a man.

Mr. Nixon served in both the line and the staff of the navy, and owing to the fact that he was ordered to duty in connection with the Roach ships when building at Chester, has been closely connected with every phase of the great national upbuilding of the navy. After he had risen to the occasion which came to him in the chance of a lifetime, to design our first battleships, he received an offer from the Cramps, and resigning from the navy, he became the superintending constructor of that great ship yard, employing 6,000 men. He remained with them while they built the Indiana, the Massachusetts, the Brooklyn, the Iowa, the New York, the Minneapolis and the Columbia; also the St. Louis and the St. Paul, and many other vessels. He then resigned from that position, but is still retained as consulting naval architect by the Cramps. Then he came to New York, leased the Crescent Ship Yard, at Elizabethport, on Staten Island sound, and began building vessels on his own account. He has doubled the size of his plant in a few years, and has built vessels for the Arctic seas as well as for the tropics, his ship yard being one of the few that have successfully competed with the English and Germans for the South American trade. His last vessel is No. 97, and in this number is embraced every type and kind of craft.

Mr. Nixon built the only successful submarine boat, the Holland, and his yard is now the great ship building school for the naval architects of the world, who came to study the six new Holland boats he is building. He has besides these now under construction the cruiser Chattanooga, the monitor Florida, mounting 60-ton 12-in. guns; the torpedo boats Nicholson and O'Brien, four Russian torpedo boats and five other vessels —nineteen in all. Some of the quickest work ever known was done by him, as when he built fourteen vessels for the Klondike trade on the Yukon river in eight-five days, and during the war built three waterboats in ninety days.

When one considers that every calling, profession and trade contributes to the building of a ship, it must be an all round man—a genius—who can create and direct the necessary organization in a way to challenge admiration and still find time for doing work that would tax the capabilities of two men besides, one must conclude that his executive ability is of the highest order—that he is a true, up-to-date American. Mr. Nixon is president and a large stockholder of the International Smokeless Powder and Dynamite Co. During the last two years under his direction this company has put in a plant covering an area two miles long and nearly a mile wide. He is president of four other companies and finds time to keep his mind full of their details, and is director in several others. His administration of the political office he holds, president of the East River bridge commission, has won the high respect of commercial and business men. Mr. Nixon is also a trustee of Webb's academy and home for shipbuilders, a member of the council and executive committee of the Society of Naval Architects and Marine Engineers, and a member of the chamber of commerce and of the board of trade.

HIS POLITICAL CAREER.

And now comes his political career. His friends believe that he will be of great service to the democracy. All agree that he is an honest man, of marvelous business capacity and energy. He is hailed as a typical man of the times, with a genius for work and organization and strong in the confidence of the community. When in the navy Mr. Nixon was ordered to the Brooklyn navy yard in 1889, and lived then at Twentieth street and Broadway. Having been born a democrat in Virginia he naturally allied himself with the democratic party, and joined the organization of the twentieth-fifth assembly district, and since that time he has always claimed New York as his residence, and has never cast a vote in any other place. How came Croker to discover Nixon? A personal friend says that while the Tammany chief was searching the country for a man who would command the confidence of men of wealth and business he was struck by Nixon's forcible and earnest efforts in behalf of the new deep channels into New York bay. Nixon had made a study of the commercial and maritime interests of this harbor, and by writing, speaking and his individual work had created a deep interest in the movement and its interests. He so impressed Mr. Croker that the latter wrote one of the strongest letters ever sent to the Tammany congressional delegation, to spare no efforts in behalf of the bill for the deepened channels, and this letter was published in the congressional record.

A visit to Nixon's ship yard, at Elizabethport, gives one a more vivid idea of his remarkable constructive and organizing ability than could be expressed in columns of description. Here 600 experts are at work on all kinds of craft in various stages of building—steel cruisers, monitors, steamships, submarine and surface torpedo boats, gentlemen's yachts, steel tunnels for sewers or rapid transits, under rivers and cities; guns and armaments, and the latest type of those wonderful tubular boilers that get up steam in a few minutes after fires are lighted, giving a pressure of 200 lbs. to the square inch and propelling war ships or yachts at swiftest speed. Here are six submarine torpedo boats of the Holland type, each 63 ft., 4 in. long and 11 ft., 9 in. beam, making them 13 ft. longer and 18 in. greater in diameter than the original Holland boat; also having twice the displacement and three times the power of the Holland. The new cruiser Chattanooga is well under way. Its length over all is 300 ft., with 44 ft. beam. The new auxiliary yacht Genesee, building for Mr. Watson, of Rochester, for deep sea pleasure cruising, is nearly finished. It is 148 ft. over all, 27 ft. beam, 14 ft. draught, 70 tons of lead ballast, with a small steam engine capable of 7 knots per hour speed. The monitor Florida is 252 ft. long, with 50 ft. beam, 12 ft. draught.

When opportunity occurred Mayor Van Wyck placed Mr. Nixon at the head of the commission charged with the building of the great new East River bridge, which will be twice the capacity of the old one. This appointment has brought him in close touch with municipal affairs, so that he has acquired practical knowledge of city administration. Since that time Mr. Croker and Mr. Nixon have become well known to each other, and while Mr. Nixon's friends claim that he is in no sense a politician, he has come to be known as a democrat who stands high in his party, though he has hosts of admirers among republicans. Mr. Nixon's writings in the magazines and for scientific and technical societies have attracted international attention, and they are generally directed to commerce and trade centering in New York, whether by canal, railroad or ocean or to the navy and merchant marine.

SOMETHING OF HIS PERSONALITY.

And what about Mr. Nixon's personality? Like Hobson, he is a Southerner, also a tall, athletic, handsome man, and a born genius for everything pertaining to the navy and difficult problems in unknown phases of engineering. Mr. Nixon is 6 ft. high and weighs 200 lbs. and shows by his carriage his early military training. He has a dark, ruddy complexion, with very black hair and hazel eyes. He is quick in movement, and quiet in speech. And now politicians and Tammany men listen to this: The typical democrat Mr. Croker has selected and is praying for day and night as he falls on his knees before the Tammany Madonna is a practical temperance man. He neither drinks nor smokes. He is a good type of the new representative American, and no man seems better qualified to forecast the great possibilities of the future development of this port, nor could any one be more untiring in efforts for its betterment.

The life of such a man brings out many incidents and associations. As a student the honor man of his class at the naval academy, in social life presented at court in London, and here a member of New York's most exclusive club, the Union, and of the Rittenhouse club of Philadelphia, and the Metropolitan of Washington; in business, president of half a dozen companies and director in as many more; in politics a vice president of the Democratic club and president of one of the most important commissions under the city government. In the summer he spends his time upon his steam yacht, the Loudoun, named after his native county in Virginia, and generally anchors in the upper bay, where he can watch and study the maritime conditions of the port. He belongs to the New York and Atlantic yacht clubs and the Richmond county country club. He exacts the most rigid performance on the part of his men, but only last week advanced their wages 5 per cent.

Mr. Nixon would not discuss the work of the committee that is now attracting so much attention. He says he will have comments to make, but that he is not yet ready to talk.

"Those who know you believe in your sincerity."

Mr. Nixon's reply was that any man who knew him, and asked him if he were sincere, insulted him, while as for those who did not know him, he preferred them to make up their opinion after he had acted.

To a man who often closes verbally, and acts without waiting for formalities, contracts amounting to hundreds of thousands of dollars, a certain amount of indignation does not appear unseemly, but Mr. Nixon evidently believes that the best way to run a city is to put it upon a business basis broad and liberal enough to suit the needs and even the prejudices of our great cosmopolitan population. One near to Mr. Nixon says:

"Were Mr. Nixon asked to advise in municipal or national matters his mind would naturally run in the channels that have enabled him to obtain successful and harmonious results from thousands of men and control them to a common end. Such a man would never expect the impossible, but with his keen insight into human nature he would soon learn what men were capable of and then by force of example inspire them to their best efforts, just as he has done all through life. If such a man cannot rest secure in the confidence of the people, who can? Evidently what he does do will be practical, and as he says he now believes he can accomplish permanent good, he should certainly not be condemned in advance."

In his home life Mr. Nixon is the most domestic of men, and is never happier than when at his winter home in the city or on his yacht, the Loudoun, in summer entertaining his friends, in which he is most charmingly assisted by his wife. She is handsome and a remarkable woman, was Miss Sally Lewis Wood, a daughter of the late Col. Wood, of the United States army, and a direct lineal descendant of Gen. Andrew Lewis, of Virginia, the colonial Indian fighter and friend of Washington. Mr. and Mrs. Nixon are like chums, always happiest when together, and her advice and aid are his sweetest inspiration.

CONTRACT FOR APPARATUS FOR COALING AT SEA.

The British admiralty, in view of the results of the experiments made by the battleship Massachusetts with the marine cableway for coaling at sea a year ago, has given a contract to the Marine Cableway for Coaling at Sea Co., of New York, for an apparatus capable of delivering forty tons of coal an hour to a vessel traveling at 10 knot speed. In the trials with the Massachusetts an apparatus designed for transferring fifteen tons an hour at 6 knot speed showed a capacity for transferring twenty-two tons an hour at the required speed and in a sea "heavier than moderate." Mr. Spencer Miller, of the Lidgerwood Mfg. Co., who is the inventor, settled the contract with the British admiralty a few days ago. The collier Muriel has been chartered for the experiment. Mr. Miller is confident that the heavier cableway designed for this contract will more than meet the requirements.

LICENSES SUSPENDED.

MEMBERS OF TUGMEN'S LABOR ORGANIZATION ENCOUNTER DIFFICULTIES WITH HEADS OF STEAMBOAT INSPECTION SERVICE—REFUSED TO WORK WITH NON-UNION MEN.

The Licensed Protective Tugmen's Association, a labor organization operating in different parts of the great lakes, started out during the past season to have members refuse to work with non-union men, and in so doing they have encountered difficulties with the United States steamboat inspection service. The licenses of two members of the association at Duluth have been suspended, as shown by the following decision from Supervising Inspector Sloane:

Messrs. Monaghan & Chalk, U. S. Local Inspectors of Steam Vessels, Duluth, Minn.—Gentlemen: On Nov. 28, 1900, I received your communication under date of Nov. 27, 1900, stating that you were unable to agree upon a decision in the matter of complaint of Walter W. Wood against Frederick W. Lee and Tracy Warren, engineers on the tug W. B. Castle, for an alleged violation of section 4,449 United States revised statutes, by refusing to serve in their official capacities on said tug on August 6, 1900, with mate Walter W. Wood, for the reason that said Wood was not a member of the Licensed Tugmen's Protective Association of Duluth, requesting me to investigate and decide the case. Section 4,452, United States revised statutes, provides that "where there shall be a disagreement between the local inspectors, the supervising inspector, when so requested, shall investigate and decide the case." In accordance with the provisions of this act I proceeded to Duluth, Minn., and on Dec. 17, 1900, investigated the alleged violation.

At the opening of the case Frederick W. Lee appeared, specially by his attorney, John H. Norton, for the purpose of making a motion to quash the proceedings and dismiss the complaint for the reason, in brief, that the supervising inspector had jurisdiction only where there was an appeal by some person wronged and that there was no authority for an appeal by the local inspectors in case of disagreement. Copy of the motion is hereto attached. I overruled the motion, believing that the law conferred jurisdiction upon me in such cases and that treasury department decision No. 10,279 of Oct. 11, 1890, had in effect so decided, and I proceeded with the investigation. Additional testimony was then submitted by Lee, which is also attached. The respondent Lee then, in writing, stated that he was satisfied to have a decision rendered on the testimony already taken, which agreement is also attached. I then proceeded to consider the case.

The complainant, Walter W. Woods, avers that on Aug. 6. 1900, he was employed as mate and pilot of the tug W. B. Castle; that he boarded said vessel about 2:30 p. m., attempting to perform his duties. The master, Isaac G. Bain, sounded the whistle at 3 p. m. for all hands to come on board and repair to their stations, ordering complainant to cast off the mooring lines. As complainant was about to execute the order Frederick W. Lee and Tracy Warren approached the master of the W. B. Castle, in presence of complainant, refusing to perform their duties as engineers on said vessel if complainant, Walter W. Wood, was employed as mate and pilot on same, giving as their reason for refusing that they were members of an organization called The Licensed Tugmen's Protective Association of Duluth, the said Wood not being a member of the association. The said Frederick W. Lee and Tracy Warren positively refused to perform their duties as engineers with any pilot not a member of said association. By reason of Frederick W. Lee and Tracy Warren refusing to perform their duties Walter W. Wood was immediately discharged. By said action Lee and Warren acted in violation of section 4,449, United States revised statutes.

First—There are, in my opinion, some general features in this case undisputed, which assist materially in reaching a conclusion, viz., Captain Hill was sick and did not wish or intend to go out with tug W. B. Castle on that day. Wood went down to the tug and was at first willing to go out. Captain Hill says that he told Bain he would prefer the man Hall on Minnesota point to go out with him, but there is not a word of evidence that he made any other objection to Wood in speaking to Bain, or told Bain that Wood could not go. After Wood reached the tug a delay was made until Lee could row to Minnesota point after Hall, though Captain Hill swore 2 p. m. was the time he intended to start the tug, when in fact she did not leave until about 5 p. m., and except upon the theory that Bain's testimony states the cause, no reason appears for this long delay. Bain was the master and he swore he hired Wood. Now, why did not Wood go? And why was this charge brought against Lee and Warren? If Hill simply expressed a preference for Hall and that was all there is to the matter, why was this charge, if fabricated, not made against Hill instead of Lee and Warren, and why did not Wood go when it was found that they could not get Hall?

Second—It is evident that there is something more to this matter. Capt. Bain was the acting master, ostensibly, or legally clothed with the power of a master, and whatever the private agreement might have been between Inman, Hill and Bain, if Bain hired Wood and Lee and Warren refused to perform their duties, or, by saying they would not perform duty because of Wood's presence on the boat, hindered the service of the tug, they are liable to the same extent as if Bain had the full power of a master. In other words, Lee and Warren could not question the authority of Bain; as to the subordinates, he had in fact the powers of a master and they could not lawfully rebel against it. The agreement between Inman, Hill and Bain, if there was such, is wholly immaterial, except as the fact might effect the credibility of witnesses. Now as to the evidence. Capt. Bain says he hired Wood and that Lee and Warren said that Wood was a "dirty stinker," that they would not ride with him; that he could not go on the boat; that they would not act as engineers with Wood; that the "dirty stinker" could not ride on the boat anyway.

Third—Capt. Hill says he did not hear this, but admits that he might not have heard all that was said. Negative evidence of this kind is of but little or no weight against affirmative evidence. The defendant Lee answers certain questions "no," but he might truthfully do so and yet be guilty of the offense charged; that is to say, Lee might have said that Wood was a "dirty stinker" and that he could not ride on that boat, and yet answer just as he did. It is not a question whether the lines were cast off, etc., but whether Lee and Warren hindered the work of the tug by their sayings or doings on the hiring of Wood. Lee being a defendant his testimony is not entitled to the same credence as that of a disinterested witness. The evidence of Rottmann, fireman, is also of a negative character. Whatever he may say he cannot be certain that he heard all that was said between the parties. So much depends on the tone of the voice, the grouping of, or assembling of the parties, etc., that one might easily be mistaken, besides he was not cross-examined, and according to Bain, was the step-son of Lee and not presumably disinterested.

In view of all the circumstances I cannot believe that this charge is a mere fabrication. No motive for such action is shown or suggested and experience has shown that a motive usually exists in such cases. The testimony that is pertinent is really between Capt. Bain, a disinterested person, and Lee and his step-son, and owing to the fact that no good reason can otherwise be found for Wood not going out with the tug after going to it, I am compelled to the conclusion that the testimony of Capt. Bain is true. If true, the offense is established. Lee and Warren's talk was clearly the cause of Wood declining to go and a hinderance to the departure of tug W. B. Castle. The violent epithets and language prevented Wood staying and delayed the tug. No after consent of Lee would change or effect this. The offense was already committed.

I am of the opinion, therefore, that Lee is guilty as charged, in acting unlawfully and in violation of section 4,449 of the revised statutes of the United States, which in my opinion renders Frederick W. Lee and Tracy Warren justly liable to suspension or revocation of license under provisions of section 4,450, United States revised statutes. I, therefore, suspend the license of Frederick W. Lee and Tracy Warren for a period of six months, commencing Dec. 20, 1900, and ending June 20, 1901.

JOHN D. SLOANE,
Supervising Inspector, Fifth District.

Duluth, Dec. 19, 1900.

SEVEN-MASTED SCHOONER PROBABLE.

It is not unlikely that during the coming year Mr. H. M. Bean of Camden, Me., will build a seven-masted wooden schooner. The success which has attended the George W. Wells, the six-master, is the inducement to venture upon the seven sticks.

"I certainly regard a seven-master as perfectly feasible," said Mr. Bean. "Look back at the progress of ship building in the past twenty or thirty years. The work carried on in this yard shows well the increase demanded in tonnage. A number of years ago I built the Annie Jones, the second three-master ever launched. She proved a success and I followed her with the Jonathan Bourne, the second four-masted schooner ever built. A couple of years ago I built the John B. Prescott, which I expected would be the first five-master ever to leave the stocks. They got a little ahead of me, however, at Bath, and the Prescott was the second instead of the first five-master to go into the water. When I began the construction of the Prescott ship builders in all sections of the country laughed at me and said I was overdoing the thing. The Prescott, however, proved a complete success and carried more coal than any vessel ever launched (you understand I am referring to wooden sailing vessels, until the George W. Wells went into commission). Finding the Prescott so successful Captain Crowley of Taunton, one of her principal owners, determined to build a six-master, and as a result the Wells was launched from my yard this summer. Again all the builders said I was overdoing the thing and that the Wells would prove too unwieldly to be a success financially. I am, however, happy to state that the contrary has proven the case. While the Prescott carried over 4,000 tons of coal the Wells can carry 5,000, and demands but two extra men in the crew, making the additional tonnage a very satisfactory investment. She has proven a very fast sailor, passing many fast ones on her recent trip, and is strong and staunch in every way. You see the additional masts and larger number of sails, keep the sails smaller and they are easier to handle and less apt to be lost. It was understood at the time the Wells was launched that if she proved successful a seven-master would be next on the docket. The Wells has proven a success in every way, so I shall not be surprised to see a seven-sticker started most any time."

"What in your opinion, Mr. Bean, will be the limit in size?" was asked.

"It is difficult to say in view of the unexpected developments of the past decade," was the answer; "still I am inclined to believe that the limit will be reached with the construction of a seven-master. I shall not be surprised to see the length run up to 335-ft. keel, a length which will certainly require seven masts. Such would add in the neighborhood of 1,000 tons to the carrying capacity of the Wells. While an even larger vessel might and very likely would in other ways be successful as a freighter, she could hardly be accommodated at the docks. Yes, I should imagine that seven masts will be the limit."

SHIP BUILDING ON PUGET SOUND.

The current issue of the Bulletin of the American Iron & Steel Association contains the following communication from Wm. F. Prosser of Seattle, in which, it is needless to say, the firm of Moran Bros. Co. is meant:

"The finest ship building plant on this northwest coast, where the conditions are in a great variety of ways more favorable for ship building than almost anywhere else in the world, is at Seattle. It is a very valuable property and has a rapidly growing business of large proportions. As you may remember, in 1886 you republished an article of mine on the value of Puget sound as a naval station, which was sent to each member of congress at the time and may have had some influence in building up what is now the finest naval station on the Pacific coast. We now have also a fine ship building plant. The prospective demand for ships on the Pacific is very large. The advantages here of climate, an important consideration, of raw material of every description, except the manufactured iron, and of harbor facilities unsurpassed in the world combine to make Seattle an ideal place for such an enterprise. The success of the Union Iron Works in San Francisco in building such war vessels as the Oregon is well known. Seattle has many advantages over San Francisco for ship building purposes. The establishment I have referred to has done considerable work for the government which has proved very satisfactory. Several vessels have been built and a large amount of repairing of government transports has been done."

STATUS OF THE NAVAL ENGINEER.

From the Engineer of London.

Lately we sketched a plan of reorganization of the engineer branch of the service. It will be remembered that the principal feature of that plan was practically a reduction of the status of the naval engineer. He would no longer rank with the executive at sea, or aim at social equality with the deck officer on shore. His attainments would be those of the best and most competent sea-going engineers in the mercantile marine; no less and no more. To compensate him for his risks and the—in many respects—disagreeable conditions of service, such as three years' commissions abroad, he would have high pay, and the pensions would be good. He should have more control than is now possible of his firemen. That is to say, when he wanted them they could not be taken away to discharge other duties; and in various ways more thought would be taken for the machinery of the ship. We have put this scheme forward tentatively for discussion. Up to the present it has scarcely been criticized at all. Possibly, perhaps, it has been regarded as so audacious that no words can do justice to its enormity. In putting it forward we stated that there was an alternative scheme about which we should have something to say. In fulfillment of that promise we now proceed to set forth the general features of this second scheme. To go into details would be at once premature and difficult.

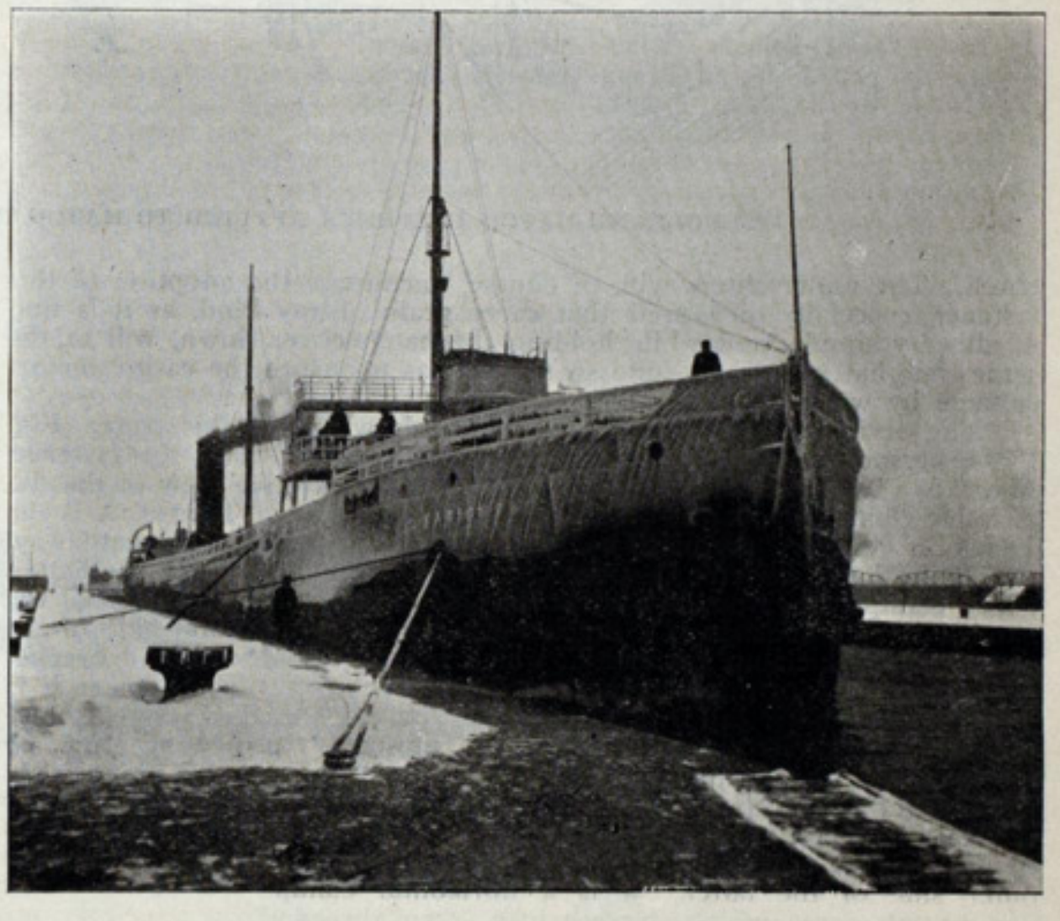
In brief, it means the supercession of the sailor altogether—not in practice, but in theory. At present the dominant idea in the navy is that a man-of-war is a ship, and that her officers and crew are sailors. That idea governs the whole policy of the admiralty. Its effects are far-reaching. It modifies the relations of all the classes and ranks of the men who constitute our naval fighting strength. It is essentially a survival from the past. Under the new system a man-of-war would be a machine, and nothing else. A machine afloat, it is true, but none the less a machine. The dominant idea modifying the policy of the admiralty and of the service would then be that the sailor had disappeared and the engineer had taken his place. Under these conditions the engineer branch of the service would be superior to the executive; or, more properly, the engineer would be the executive. Just as we have advanced arguments in favor of the first scheme, we can now adduce arguments in favor of the second, which is the exact antithesis of the first. The modern man-of-war is a gigantic structure of iron and steel, which depends for her existence and her utility on the engineer. The modern gun is an extremely beautiful and complex machine, with next to nothing in common with the smooth bore of Nelson's time. The same truth holds good of the torpedo. Sails have entirely disappeared. The mast is a signal tower, or a place of observation. The "nimble topmen" have gone below as stokers and greasers. The great guns are loaded and fired by machinery. From first to last the engineer is everywhere and everything in the man-of-war. There is still room for the fighting bluejacket or the marine. There is none for the sailor, who has become an anachronism. But, it may be urged, we must still have seamanship. What does the word mean? In Nelson's time it meant a great deal. It involved a great deal. The art of sailing a ship through the tempest and calm represented a very high standard of acquired experience, natural good sense, and special knowledge. There is nothing at all like this needed in the present day. An engineer might learn to carry out all the evolutions of a fleet just as well as an admiral or a captain, and when it comes to fighting, we doubt if any admiral or captain could excel the engineer in knowledge of what a ship could or could not do. It will, no doubt, come with a certain jar to the naval officer to be told that the engineers could do all that he does; that an engineer might be a post-captain, or an admiral in command of a fleet. Yet we question that the naval officer could advance any stronger argument to prove that these things are impossible, and very able engineers in all but the name have already been captains in the British navy.

A glance at recent history will do much to prove that the true character of a modern fighting ship is beginning to be realized among all the principal nations. We have only to compare the position of the naval engineer of today with his position forty years ago, to see that, although progress towards a complete appreciation of the situation has been slow, it has been none the less sure. Notwithstanding all the drawbacks of the position, the naval engineer is more in evidence than he has been yet, even in this country. In the United States we have an intensely mechanical people, building up a navy in the light of the experience of the rest of the world, and their congress has taken the first steps to make the engineer the dominant factor. The engineer is the equal of the deck officer in the United States navy. The next step will be to throw the past overboard altogether, and make the engineer the superior of the deck officer. It is beyond all question that even at this moment there is nothing in the rules of the United States service to prevent an engineer from being the captain of a ship. That nothing of the kind has as yet taken place, or, perhaps, will take place for some time yet, is simply the result of naval inertia, and the force of popular opinion not yet reconciled to the idea. We have recorded Admiral Melville's statement that so far the whole plan has been a failure. The engineer comes on deck; the executive will not go below. We said that the scheme is bound to fail, and we have given some reasons why. But the principal reason is that the change has not been sufficiently thorough. Let the engineer be above the executive or line. The discipline of the ship would then secure the presence of engineers below, just as it now secures the presence of officers on deck, as a mere matter of course. The whole "inwardness" of the service would be changed, and that which is now distasteful would become honorable.

To carry out the plan fully in this country, however, a radical change would probably have to be made in the training and education of our officers. Years of study and training are now required to turn out what is deemed a satisfactory executive or line officer. Precisely the same statement holds good of the naval engineer. It seems to be impossible to combine the two educations as they now are. There is not time. The difficulty would have to be got over by dispensing altogether with much teaching that is of no practical value whatever at sea. This applies to both branches of the service. The new curriculum would have for its object the making of a man an efficient engineer, so far as his particular work in the navy was concerned, and an efficient executive officer also, so far as his duties were concerned, that is to say, his training would be highly specialized. There would always be, as there are now, men who would pick out certain branches of duty and develop their powers of dealing with them. Thus, we might have the electrician, and the torpedo lieutenant, the navigating officer, and so on. Really nothing would be done to diminish naval efficiency, but rather to promote it. The species of training now given in the United States might be taken as a foundation or an example to guide us in formulating a new system.

Our readers have now two definite schemes before them for the improvement of engineering in the royal navy. Neither the one nor the other is advanced by us. They are only alternative schemes, which are to be taken for what they are worth. Either appears to be a solution, deserving careful discussion, of a great difficulty. It is certain that matters cannot continue as they are now. The public are becoming restless and apprehensive. Dissatisfaction is being expressed in every direction with the admiralty, with our ships, with our machinery. Very strong action was taken in parliament last session. Our readers may rest certain that the agitation will be renewed next year. Unpleasant questions are being asked concerning the competence of those who are in charge of the machinery of our ships. It is urged that the engines, at all events, main and auxiliary, are built by the best engineers in the world, and yet that they are incessantly breaking down under very moderate tests, and it begins to be said that it is not the fault of the engines but of those in charge. Account will have to be taken of these things. The cases of the Europa, the Hermes and the Highflyer demand careful investigation. There were grumbles about the Powerful and the Terrible—some ships do very well, others very badly. Why?

We are not sanguine enough to suppose that either of the schemes which have been sketched will receive attention at the admiralty. Yet we think it will be difficult for the government of this country to ignore altogether in debate the remarkable action taken by the United States. The change, whether it succeeds or not, at all events represents the heaviest blow ever struck at the dominance of the executive branch of the service, and we may yet live to see the United States navy commanded by engineer officers. "Straws thrown up show what way the wind blows." It is not for nothing that Sir John Durston, in this country, has been given the relative rank of rear admiral, and George Melville in the United States, the rank of rear admiral.



The above is a photograph taken of the Maricopa as she passed through the Sault canal on Dec. 6 on her last trip of the season. She encountered a driving storm on Lake Superior, which literally encased her deck and sides in ice. Capt. Henry Zealand, who stood on the bridge for thirty-six hours continuously, brought her safely through it.

COLUMBIA AS A TRIAL BOAT.

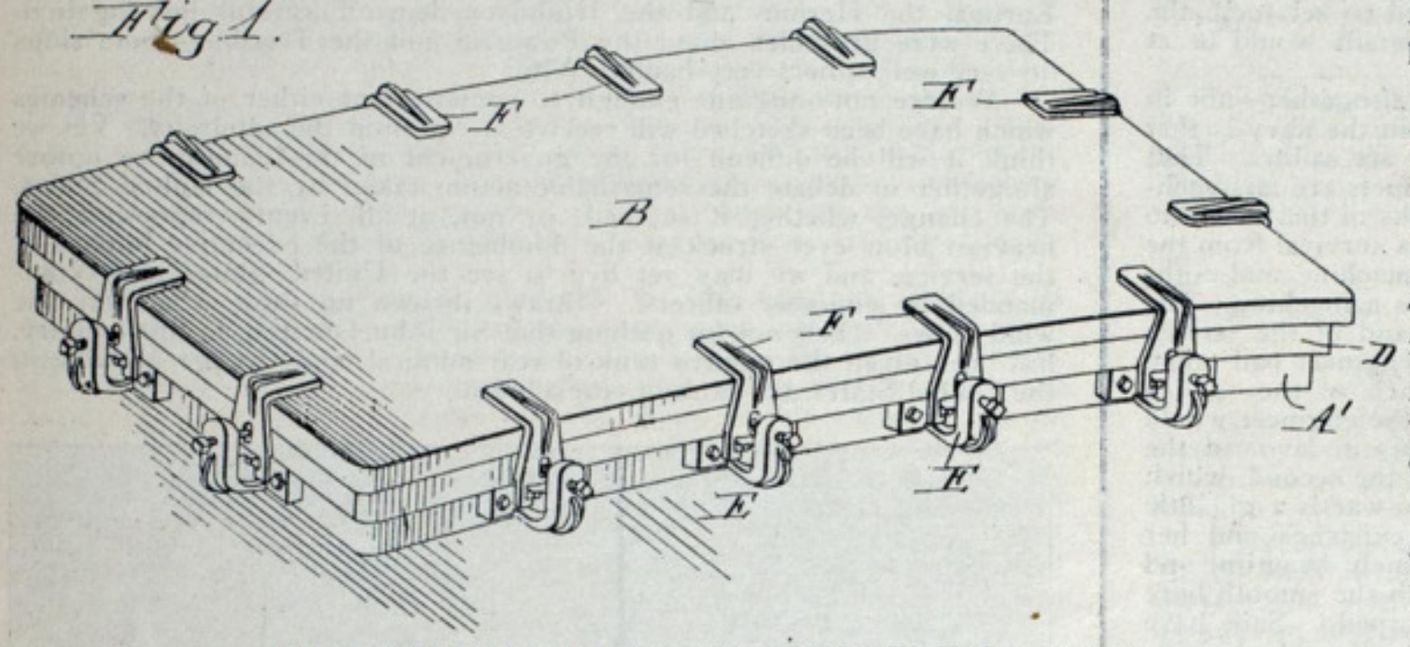
Secretary J. V. S. Oddie of the New York Yacht club has announced that the Columbia will be in commission and will be sailed against the new defender as a trial boat and for the honor of defending the America's cup, if she should prove faster than the new yacht. The Columbia will be managed by former Commodore E. D. Morgan, and Capt. Charles Barr will be the skipper. The Columbia is hauled out at City Island. She will not be put in the water until a short time before she is wanted, as there is nothing to do to the yacht except fit her out for racing, and it will only take a few weeks to do that. She will be put in the best possible shape, and in the hands of ex-Commodore Morgan and Capt. Barr should be able to make the new boat hustle to beat her. Capt. Barr is thoroughly familiar with the yacht, and it was a wise plan to make him sailing master of her again. Many yachtsmen are of the opinion that the Columbia will be faster this year than when she defeated the Shamrock.

Former Commodore Morgan is an experienced yachtsman. In the early 70s he owned the sloop Dudley and then had the Vindex built, which was the first iron sloop ever built in this country. The schooners Wanderer and Albatross were his next yachts. He owned and raced the Tomahawk and the 40-footer Moccasin, and then the big schooner Constellation was built to his order. The cat yawl Gannet was his boat. This yawl was the forerunner of the Gloriana, also built for Mr. Morgan and which made Herreshoff noted as a designer. The fin keel Drusilla, also a Herreshoff boat, was built for Mr. Morgan and at that time was the largest fin keel boat constructed. Mr. Morgan was one of the syndicate that built the Vigilant. Of late years he has raced the 30-footer Puck. Among other yachts owned by him were the sloop Mayflower, catboat Mucilage, sloop Comfort and Muriel, and the steamers Amy, Catarina, Javelin, Ituna, Daisy and May. He has probably done more to bring Nat Herreshoff to the front as a designer than any other yachtsman.

A HATCH FASTENER THAT IS A SUCCESS.

Capt. Mulholland, who has sailed vessels of the Bradley fleet, Cleveland, and whose present command is the steel steamer Alva, has patented and is now selling a hatch fastener that will very probably be found on all the larger class of vessels of the great lakes within a very short time. Of course the device is suited to any vessel, wood or steel, that has hatches, and the market for it is by no means confined to the lakes. Within the few days since his own steamer, on which the device was tried during the past season, was put into winter quarters, Capt. Mulholland has taken orders to equip vessels that will require about 9,000 of the fasteners. These orders have come from simply showing a model of the device to a few leading ship owners. Among the orders is one from James Davidson, the ship builder and ship owner of West Bay City, to equip all his vessels. The Jenks Ship Building Co. of Port Huron, has ordered 400 to be used on two new steel steamers which they are building, and the vessels of the Hutchinson fleet, Cleveland, are also to be among the first to be equipped. About thirty of the fasteners are required for a 30 ft.

Fig 1.



MULHOLLAND HATCH FASTENER APPLIED TO HATCH COVER.

hatch. The underwriters will, of course, encourage the adoption of this fastener, especially on vessels that carry grain of any kind, as it is first of all very simple, and while holding the hatch cover down, will at the same time batten the tarpaulin so securely as to insure the cargo against damage by water.

The device is clearly illustrated in the drawings on this page. Fig. 1 is a perspective view of a hatchway cover provided with the fastener. Fig. 2 is a transverse section, and Fig. 4 is a perspective view of the detachable clamp member at the fastening. In the several figures, A is the deck of a vessel A′ the usual coaming around the edge of the hatchway, and B the hatch cover. C is the canvas or tarpaulin, and D the batten which clamps the tarpaulin against the side of the coaming. Each of the hatch fasteners consists of a bracket E, secured to the outer side of the coaming, and a clamp member F, which is interlocked with said bracket and which overlaps the marginal portion of the cover. The bracket E is provided at its inner end with a base plate which is bolted or riveted to the coaming, and at its outer end with an upwardly projecting lug or standard, e′. The clamp F has the form of an angle-iron and its horizontal member bears upon the cover, while its shank or vertical member f is arranged between the standard e′ of the bracket and the batten, and bears against the outer side of the latter. g is a horizontal clamping, or set screw, which engages in a screw threaded opening formed in the standard e′ and bears at its inner end against the outer side of the vertical member f of the clamp, so that upon tightening the screw it forces the clamp member and the batten inwardly and causes the batten to clamp the tarpaulin against the coaming. As shown in Fig. 2, the batten projects slightly beyond the rim of the cover and the coaming, so as to leave the necessary clearance between the clamp member and these parts to insure the clamping of the batten and the tarpaulin. The clamp member is provided at its lower end with a pair of inwardly extending hooks h, which are arranged parallel with the coaming and which engage under the lugs i, projecting forwardly from the base plate of the bracket E. The upper faces of these hooks are inclined inwardly, or toward the coaming, as shown at h′, and the contiguous under sides of the lugs i are correspondingly beveled, as shown at i′ in Fig. 2, so that upon forcing the clamp member toward the coaming by means of the set screw g, said member is at the same time drawn downwardly by action of the inclined surfaces h′ and i′, thereby tightly clamping the cover upon the coaming. The side portions of the bracket E are recessed in front of the lugs i as shown at j in Fig. 2, to leave a space for the passage of the hooks h in engaging the same under the lugs. A vertical groove l, Fig. 4, which receives the inner end of the set screw, prevents a sidewise movement of the clamp F.

A valuable feature of this fastener is that in the act of tightening the batten by the clamping screw g, the clamp member is automatically drawn downward upon the cover. This renders its manipulation quick and convenient, and at the same time does away with the long bars and strongbacks which are a necessary part of other fasteners. To release the cover it is only necessary to unscrew the clamping screw g sufficiently to allow the hooks h to be disengaged from the lugs i.

Capt. Mulholland's address is No. 437 Wade Park avenue, Cleveland.

Stone Bros., Harbor View, San Francisco, are building a five-masted wooden schooner, the first ever constructed on the Pacific coast.

PREPARING FOR THE AMERICA'S CUP CONTEST.

The mystery surrounding the 90 ft. centreboard sloop which Charles C. Hanley says he is going to build for competition in the trial races for the America's cup, has not been dispelled owing to Hanley's refusal to make public the names of the gentlemen composing the syndicate. Not a few yachtsmen are of the opinion that Thomas W. Lawson is the man most deeply interested in the boat. It is argued here that if Sir Thomas Lipton is having two boats built as challengers for the cup and will sail the fastest one of them in the races against the speediest American boat afloat, why should not Lawson build two racers and have one or both in the trial race?

It is a well-known fact that Gen. Paine favors the centreboard type, and when Lawton first talked of building in competition with the New York syndicate Crowninshield was called upon to design a boat of that type. The design was that of a craft 140 ft. over all, 86 ft. on the water line and 12 ft. draught, with the board hauled up. Her beam was 26 ft. at the load water line, and the sail plan was plenty of canvas, while not presenting the appearance of overburdening the boat. The displacement was fixed at 125 tons. The latter would mean that the craft would have nearly as much lead in her keel as either the Columbia or Defender, and the board would work up and down through the slit in the lead. The bilges were rather hard, while the bow was carried out much after the style of the champion 25-footer, Flirt. At first glance the craft resembled Gen. Paine's old sloop Jubilee, but a careful examination showed many differences. Hanley's boat is going to be a pure centreboard, that is, one without a particle of outside ballast beyond a weighted board. This is the model so long a favorite with Boston yachtsmen, and it is not improbable that Lawson, if he really is at the head of the Hanley syndicate, was persuaded to follow the old style rather than a composite keel and board craft. Then he will have two boats of exactly the opposite type, and would settle forever the question of which is the speedier in all kinds of weather.

Preparations for work on the Crowninshield boat are going along rapidly. The site for the shed in the Atlantic works yards at East Boston has been staked out and within a few days the carpenters will begin building. Crowninshield says he will give out the dimensions and a general description of his boat when the proper time arrives, but he does not think it wise to do so at present. He is being deluged with suggestions for the rigging and model of the craft. A letter signed "Fairness," was received a few days ago from New York. The writer advises him not to make public the dimensions, as it would only satisfy idle curiosity and be to the disadvantage of himself, Mr. Lawson, and to those of the American public who think they should profit by every fair act. He says neither Sir Thomas Lipton nor Mr. Belmont would make such a concession and does not see why Crowninshield should. The model of the Lawson boat was shown this week. It is that of a craft with a long canoe like bow, very lean counter, almost straight forefoot and considerable dead rise. The stern is very narrow, although not so extreme as the Columbia's and much longer than anything we have had yet. The lead keel is blunter at its forward end than was expected and its greatest vertical section is about one-third the distance aft and directly under the midship section. At the Ansonia Brass & Copper Co.'s works in Connecticut, ingots are being cast for the plates, which leads to the conclusion that the underbody will be of a special composition rather than bronze. The steel for the frames is being rolled at Phoenixville, Pa. The rivets are to be made of alta metal, which is very tough and capable of being riveted at a low heat.

Fig. 2.

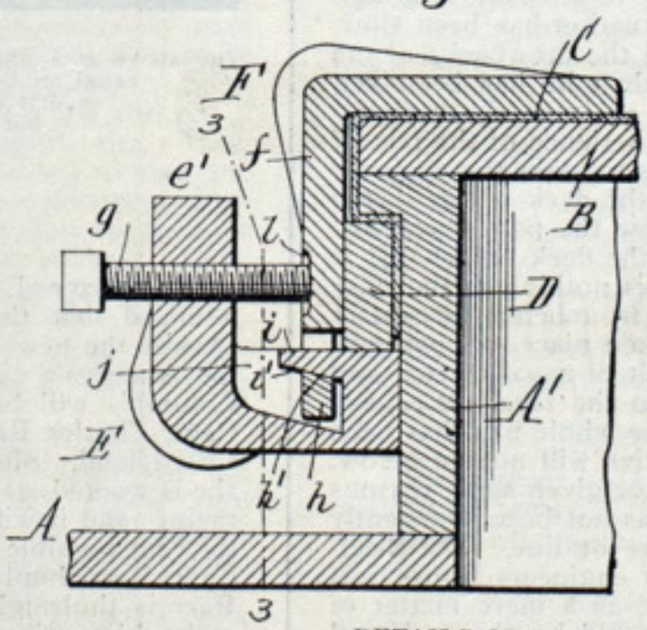
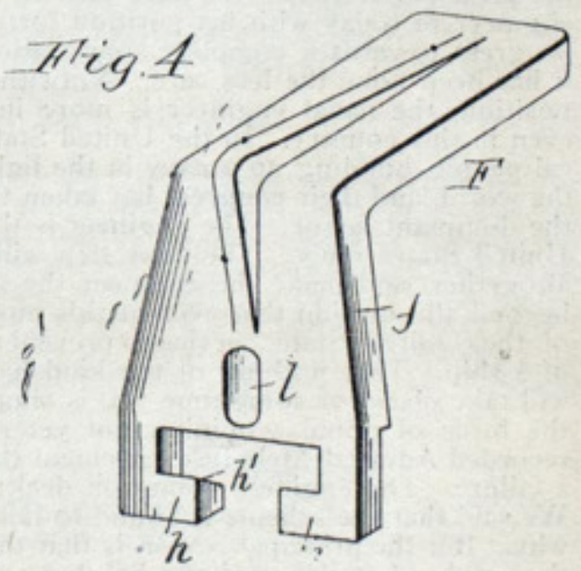


Fig. 4



DETAILS OF MULHOLLAND HATCH FASTENER.

Operations of the American Bridge Co. are certainly on a very large scale. They have lately taken a contract for three large viaducts on the C. B. & Q. R. R. and are building a 300-ft. draw span for the same company. The Rock Island company has also placed with them a contract for 3,500 tons of material to be delivered during 1901. Among other large contracts are the following: Highway bridge at 145th street, New York; two large viaducts for the Oregon Short line; twenty-five highway bridges in Kansas; the structural steel work for the new 14-in. continuous mill for the Carnegie Steel Co.'s Duquesne steel works; the structural steel work for a new armory at Medina, N. Y., and a large steel building to be used as a blacksmith shop for the A. T. & S. F. R. R. Co. at Topeka, Kan.

CHARLES H. CRAMP BEFORE THE INDUSTRIAL COMMISSION.

For several days past the industrial commission has been taking testimony before the Manufacturers' Club in Philadelphia. Last Saturday Mr. Charles H. Cramp was summoned before the commission. Mr. Cramp gave a review of the shipping industry and its present condition. He favored the passage of the shipping bill saying that now was the opportunity for the United States to take hold and compete for the trade which Great Britain had lost through the war with the Boers. In reply to a query of Mr. Kennedy, Mr. Cramp made emphatic denial of the story from London, England, that his firm, with the Midvale Steel Co. had sold out to the Vicker's Sons & Maxim. He read in this connection his statement issued several days ago and already published in the Review.

Speaking of the shipping bill, Mr. Cramp said he was sure that the great steamship companies of Europe are sending enormous sums of money here to defeat the measure now pending in congress. Other opposition to the bill, he said, was being fostered by the transcontinental railroad companies.

"The Western railroads are the greatest looters of the public treasury this country has ever had to contend with," he said. "Their land grants were grabs, and now for fear that the Pennsylvania railroad may benefit by the subsidy they are opposing it in every manner possible because they are not provided for in it."

It is the opinion of Mr. Cramp that the American merchant marine cannot be rehabilitated without subsidies. He had been on many committees to suggest a remedy for the decadence of the shipping trade of the country, and many reports have been made, but nothing done. He said the big vessels were not the only ones that would be benefited by the bill. Fast and slow freight carriers were provided for. He was also of the opinion that a limited number of foreign controlled vessels, if built in American ship yards, should be admitted to American register free. Mr. Cramp condemned the competitive method of awarding contracts for boats by merchant shippers. "There is," he said, "no foolish competition in Great Britain. The men who can build boats are known and they have their price. If the man wants the boat he pays the price; if he does not pay the price he does not get the boat. That plan will be followed by our company in the future. We will not bid for boats when the contract is to be awarded to the lowest bidder. There is no use competing with a bicycle maker or any other man who thinks he can build a boat."

"How about government contracts?" asked Mr. Clarke.

"Oh, that's different," replied Mr. Cramp. "The yards in the world that are equipped to build a first-class battleship can be counted on the fingers of my hand. Small yards have learned that to build a government boat is an expensive operation and one experience is usually enough for them."

In reply to a question Mr. Cramp said it cost more to build a ship in the United States than in Europe, but that after it was built it was a better structure than the foreign-made vessel. Mr. Cramp said that Germany was in control of the greater part of the commerce of the North Atlantic. This he attributed to the Boer war, which he said was the greatest disturber of interoceanic transportation in the history of the world. "Emperor William," he said, "is quick to take advantage of a nation's weakness when it will advance Germany's interests, and when he saw Great Britain robbing her merchant fleets to send to South Africa as transports and colliers he stepped into the gap and supplied the vessels for commerce. It is a mistake to use merchantmen for transports and colliers. When these vessels can be returned to their former use they will be out of date, their type is rapidly becoming obsolete and their value will be chiefly as coasters. It is now America's chance to build up a merchant marine and commerce of the seas. Of course England will always have to be considered in maritime affairs, but America is just beginning to realize its opportunity. In a short time both England and Germany will have to come to the United States for their raw material to build ships, and in that sense America will then be a controlling factor in the shipping of the world."

ANNUAL REPORT OF THE LIGHT-HOUSE BOARD.

The United States light-house board, according to its annual report, is making an effort to secure an appropriation to equip several light-ships and light-houses with wireless telegraphy or telephony. The board believes that the success of the system has been so fully demonstrated as to indicate that it would be invaluable in communication between light-ships and the shore, resulting sometimes in the saving of life. It is proposed to introduce the system gradually, and an appropriation of $25,000 is wanted for a beginning. Among other recommendations made by the board, of whom Rear Admiral Higginson is chairman, is that $75,000 be appropriated for extending and maintaining the new light-house established in Porto Rico, and $25,000 for the same purpose in Hawaii, provided the Hawaiian light-house establishment is turned over to the board. The board also urges increased appropriations for new and improved buildings in place of the small and dilapidated ones at present existing at light-houses in many remote localities where the comforts of settled communities are hard to obtain, and says that these repairs and improvements will cost $700,000. It is also urged that the commerce of Alaska calls for an expenditure of at least $500,000 in aids to navigation, of which there are almost none at present in those waters.

The Midvale Steel Co., Philadelphia, will build propelling machinery for vessels built by the Eastern Ship Building Co., New London, Conn. The two mammoth steamers building for the Great Northern Steamship Co. will have four triple expansion engines of 54-in. stroke, the indicated horse power being stated as over 10,000. The diameter of cylinders are 34, 57 and 96 in. The machinery has been designed throughout by the Eastern Ship Building Co. The Stirling Co., with main offices in Chicago and works at Barberton, O., will manufacture Niclausse boilers for the Great Northern steamships. There will be thirty-two boilers with over 80,000 sq. ft. of heating surface and 2,000 sq. ft. of grate surface, working at 250 lbs. pressure. It is said that in both engine and fire rooms of these steamers many very interesting innovations will be seen, labor saving and economy having been constantly considered in the design.

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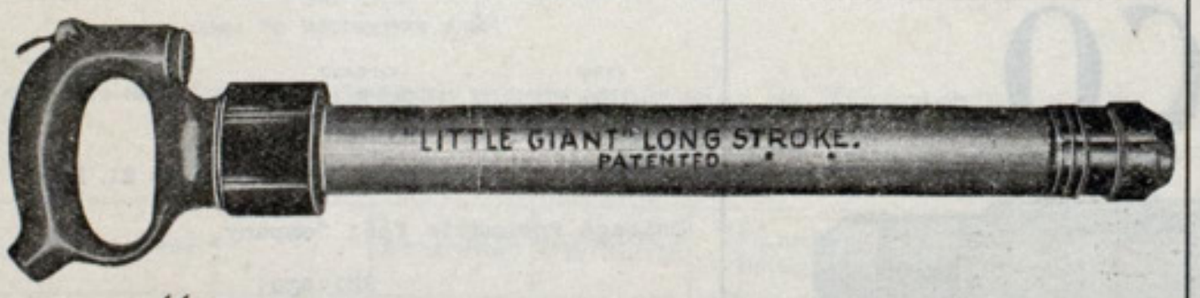

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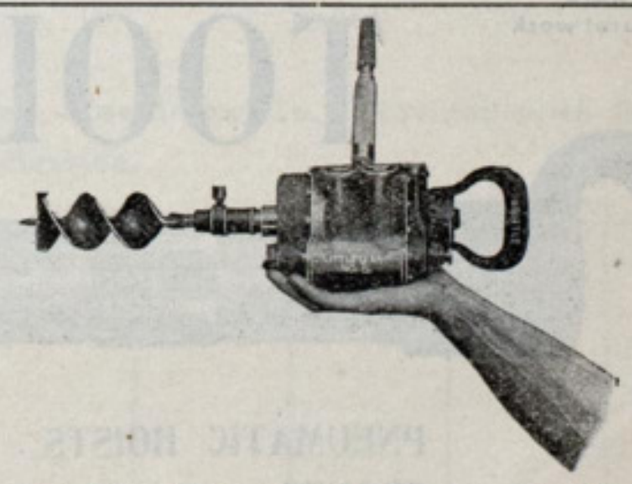

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DEPRESSION IN THE BRITISH IRON TRADE.

English trade journals unite in describing the present condition of the British iron industry as serious if not absolutely alarming. Within the last two or three months demand has sensibly slackened and prices have declined. American competition in British home markets is more active and more menacing than it has yet been. Raw materials for British mills and furnaces can not be reduced in price to anything approaching American figures. German competition is also active. The outlook is frankly conceded to be exceedingly unfavorable. We quote below a few paragraphs from recent English papers.

The London Iron and Coal Trades Review says in its issue for Nov. 16: "Let us know where we are. We have to face the acknowledged fact that if other nations are permitted without let or hindrance to dump their surplus produce on our shores, more or less regardless of price, the system must ultimately tend to the very serious detriment and possibly to the final ruin of the British iron trade. The conditions of this form of competition are vastly unequal, and this is the rock upon which both our economic system and our great industries are most likely to split. It may, of course, be that under a universal system of free trade Great Britain might be so much worsted by superior mineral and transportation resources, more skilled and tractable labor, more enterprise and effective initiative on the part of capital, and more economical and up-to-date equipment, that there could be no doubt as to our being completely beaten on our merits. In that case British manufacturers would probably, nay, certainly, ask no privileges from the state or address any ad misericordiam pleas to any quarter. The average British manufacturer and merchant has never asked for any help to enable him to fight his battles so long as he had 'a fair field and no favor.' But this is exactly what he has not got at present, and until he gets it he is liable to be left more or less helpless in the race. This is one of the penalties, as we have again and again pointed out, that the manufacturer and merchant have to pay for the unique concessions granted to the general community, and while we are far from saying that free trade is not the system most suited to British needs we do say that this is a matter which must be carefully reconsidered as competition becomes more formidable and perhaps irresistible." All this points very clearly to a demand for the imposition of protective duties for the benefit of British ironmasters.

The London Ironmonger for Nov. 17 is even more discouraged. It says: "The general feeling in Scottish iron and steel circles is anything but cheerful, and there is a general consensus of opinion that business is exceptionally difficult to obtain. The change from exceptional activity to comparative slackness has come with dramatic suddenness. There are still a number of departments in which great activity prevails and will continue for some months; but in the majority slackness, or the foretaste of such, is already in evidence to a degree that, in some instances, portends stoppage before long. The branch of trade which shows the most weakness is that of malleable iron. American and German bars, strips, and other material have been freely imported at prices fully 20s. a ton below Scottish figures; and even now, though the local makers have reduced their quotations by more than 20s. a ton, they can not recover their position, as foreign competitors are still reducing their rates. In order to meet outside competition and to keep their home markets makers have lowered prices for plates, etc., substantially, but, it is feared, not yet sufficiently. Some business has been done in plates at £6 17s. 6d., but producers affirm that they are losing money at that figure, and they add that unless they secure some concessions in costs it is impossible to take that figure for quantities. Coal prices, fortunately, are on the wane; but expert opinion is unanimous that poor times are in store for the Scottish steel trade—in fact, for all branches of the manufactured iron trade—unless there be a speedy easing of prices for fuel and for hematite and a reasonable break in wages. While these lines are being written it appears that the position in America is undergoing some slight improvement, possibly owing to the return of Mr. McKinley to the presidency, and possibly because the fall had been overdone. Be the reason what it may, the position is undoubtedly a little better than was the case a few weeks ago, and, as our Philadelphia correspondent has indicated, it is quite possible that an attempt may be made by the powerful consolidations of iron and steel interests to bring about a general leveling-up in prices. Meantime the British iron trade is almost in despair, and the tenor of reports from the Midlands would seem to indicate the existence of a belief there that the end of the world is at hand so far as the iron trade is concerned."

The imports into the United Kingdom of pig iron and of finished and unfinished iron and steel have rapidly increased in recent years and promise to exceed in 1900 the record of any previous year. The total imports in the first ten months of 1900 of the articles mentioned amounted to 557,329 tons, against 645,019 tons in the whole of 1899, 591,425 tons in 1898, and 362,827 tons in 1897. The imports of "unwrought steel" alone in two months of 1900, September and October, amounted to 55,809 tons. English manufacturers have fresh cause for complaint in the recent sale of a large order of rails and fish plates by the Carnegie Steel Co. to the Great Eastern Railway Co. The grievance is so acute that there has been some official correspondence on the subject. The manager of the Great Eastern, however, gives the best of reasons for placing the order in Pittsburg. First, the English manufacturers would not undertake to make delivery at a date early enough to meet the company's necessities, and, second, the American rails are cheaper.—Bulletin of the American Iron & Steel Association.

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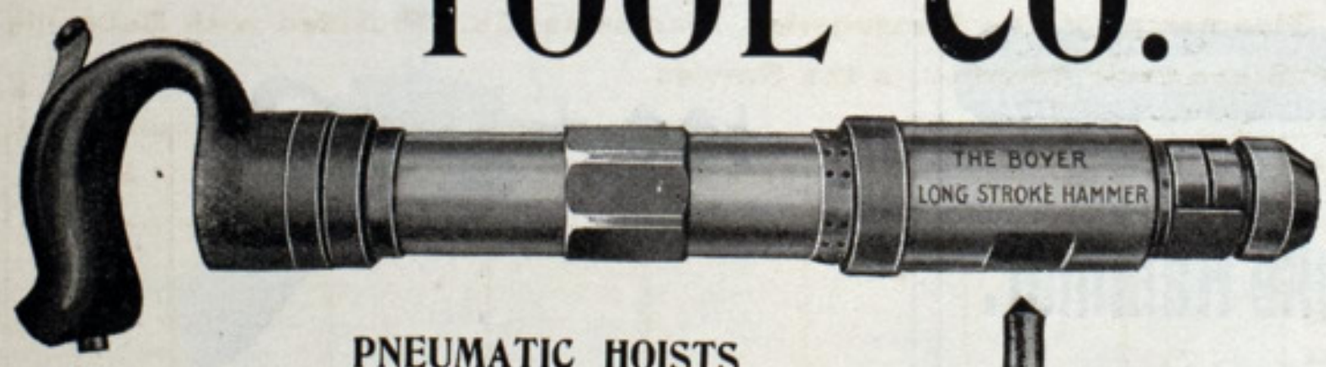

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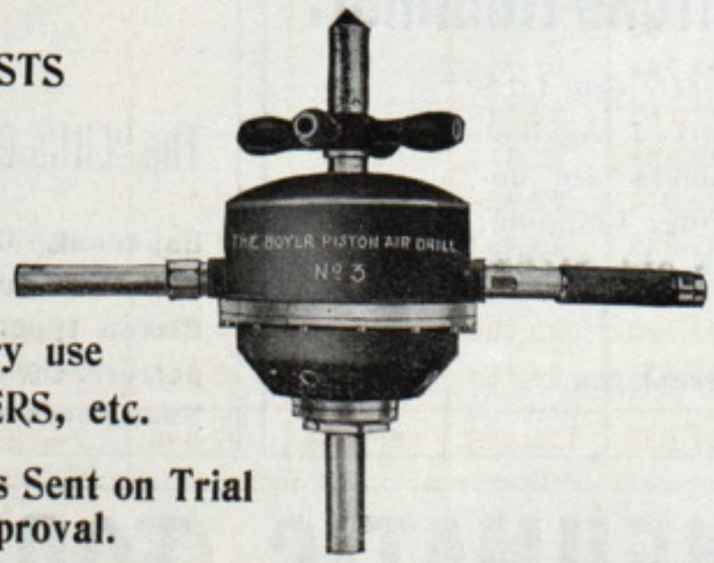

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SHIPPING BILL AND TRADE EXPANSION.

From the Manufacturers' Record, Baltimore.

In a letter published in the last issue of the Manufacturers' Record Harlan & Hollingsworth, the ship builders of Wilmington, Del., referring to the outlook for ship building in America, say: "We must either work under present conditions and remain where we are now and build for local and coastwise trade, or else have congress take some action that will enable us to meet foreign competition and have owners build ships that can successfully compete with those which are now subsidized by other nations."

Now that the country has settled down to at least four years of strict attention to business and the broadest development of American business interests, the whole country should unite in urging upon congress the passage of the bill to aid our merchant marine. This is one of the greatest questions confronting us. It is of supreme importance to the whole country, but no section would be more greatly benefited by it than the south. Our commerce must find transportation facilities in American vessels or else be seriously handicapped. Every steamship built in this country increases our power in the great struggle for the world's trade. With the development of the export trade of the south the possibility of enlarging our foreign shipments of coal and iron and cotton goods, and of establishing ship yards at the south Atlantic and gulf ports, the south should take the lead in advocating government aid to our merchant marine. Fifty years ago the old south was deeply interested in the upbuilding of our shipping interests, and, as so often shown in the Manufacturers' Record, many conventions were held between 1837 and 1860 looking to that end. Once more the attention of the south is turning to the same subject, and the business people of this section should urgently impress upon their representatives the importance of joining with those of the north and west in this work and to press the importance of immediate action. With the passage of a bill giving government aid to American shipping the capital of this country would turn to that industry with the same avidity with which twenty years ago it handled the wonderful expansion of our railroad interests. This would mean many new ship yards, the employment to the fullest extent of every yard now in operation, and a great increase in the demand for iron and steel, and, finally, the much needed transportation facilities for reaching the world's markets in ships flying the American flag. Add to this the construction of the Nicaraguan canal, a measure of world-wide importance, advocated alike by Democrats and Republicans, a measure which should be pressed through at the coming session of congress, and we will then indeed have entered upon a period of expansion in trade far beyond our present comprehension.

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HURON-ONTARIO SHIP CANAL.

Canadian newspapers never tire of talking about a ship canal to connect Georgian bay with Lake Ontario, although the cost of such a waterway would be almost equal to Canada's expenditures on canals since the beginning of the government. A Toronto dispatch says:

"Gen. Russell Thayer, a capitalist of Philadelphia, is negotiating with Mayor MacDonald of Toronto for the purchase of the latter's rights in connection with the Georgian bay ship canal and aqueduct scheme. It is understood that Gen. Thayer has an engineer looking into the scheme and, though nothing definite is stated, it is believed his decision in the matter depends on American capitalists and the report of the engineer. In some quarters it is expected that Gen. Thayer will take hold of the project. The scheme is to connect Lake Huron and Lake Ontario at Toronto by a canal, for which it is believed much of the western grain trade could be secured. The projected canal would be much shorter than the present route."

PINTSCH LIGHTS IN CANADA.

The Canadian government has ordered of the Safety Car Heating & Lighting Co., New York, four Pintsch range lights and one beacon, to be used near the entrances to the Soulanges canal. Two of the range lights will be located at Coteau and two range lights and one beacon will be in service at the Cascades. The range lights will show a beam of about 130 candle power and will burn for eighty-seven days on one charge of gas.

The increase in the use of the Pintsch system of harbor and channel lighting in Canada has been quite marked during the past few years. The various styles of lights controlled by this company have all been used by the Canadian government, namely, the range light, beacon and lighted buoys. It would not therefore be surprising to hear that the Canadian government is to use the new combination Pintsch gas and bell buoy which is now being tried by the United States government.

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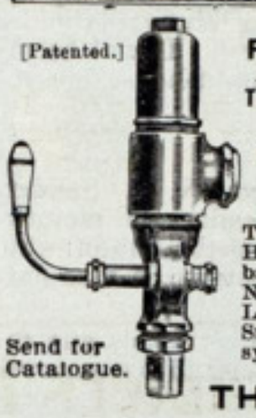

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Year.	Australian	Polynesien	Armand Behic	Ville de la Ciotat	Ernest Simons	Chili	Cordillere	Laos	Indus	Tonkin	Annam
1890	22,576	820									
1891	22,749	22,777	68								
1892	22,749	22,801	23,274	7,753							
1893	22,793	22,781	22,762	22,749							
1894	22,813	22,789	22,858	22,813	12,567						
1895	22,891	22,922	22,913	22,936	13,629	9,571					
1896	23,178	30,906	23,232	23,183	20,735	21,051	13,572				
1897	22,750	23,202	30,912	23,185	20,745	25,370	21,119	14,382			
1898	23,646	23,178	23,184	23,199	20,842	21,080	21,080	20,851	21,318	7,569	
1899	23,178	23,205	22,477	30,135	20,082	20,926	20,956	17,448	18,285	14,669	7,628
Total	229,323	215,381	191,680	175,953	108,600	97,998	76,727	52,681	39,603	22,238	7,628

ATELIERS ET CHANTIERS DE L'ERMITAGE, À ST. DENIS (SEINE), FRANCE.
WORKS AND YARDS OF L'ERMITAGE, ST. DENIS (SEINE), FRANCE.

TELEGRAPHIC ADDRESS: BELLEVILLE, SAINT DENIS, SUR SEINE.

AROUND THE GREAT LAKES.

Local inspectors at Toledo have suspended for six months the license of S. H. Walla, who had charge of the steamer Denver at the time she ran into and sunk the steamer Specular in Pelee passage, Lake Erie.

Charles L. Hutchinson, Martin Mullen and others of Cleveland have bought from Capt. James Davidson of West Bay City the wooden schooner Abyssinia, a vessel of 3,600 gross tons capacity which came out in 1896. The Abyssinia will tow with one of the steamers controlled in the office of Hutchinson & Co.

Capt. Talbot of the Minnesota line steamer Mariska reports sighting the wreck of the schooner Charles Foster while on his way from Buffalo to Cleveland to tie his vessel up for the winter. The wreck is about seven miles off shore and between six and seven miles west of the Erie peninsula light. It is marked by one big black spar, which protrudes about 20 ft. above water on a still day.

Ore docks Nos. 4 and 5 at Two Harbors, Minn., belonging to the Duluth & Iron Range Ry., will be raised 9 and 6 ft. respectively, making them 60 ft. above high water. Each of these docks is 1,200 ft. long and 50 ft. wide. The company will improve the easterly half of its harbor room at Two Harbors, and will ask an appropriation of $400,000 from the government for a breakwater protection. This breakwater will be 2,200 ft. long and will enclose room for five ore docks, etc. The company will commence work as soon as the breakwater is completed, and will expend $3,000,000 on its improvements, which will enable it to handle twice the present tonnage.

Saturday evening, just previous to his departure for his home in Cleveland, Capt. Dobson of the steamer Manhattan received the following complimentary note from Com. F. W. Symonds of the ninth light-house district: "I have been informed by Mr. Shields and Mr. McCauley, keeper and assistant-keeper of Squaw island light station, of the humane courtesy and also unremitting attention and kindness shown them by you and those of your command from the moment they were rescued by you from their capsized boat near Whiskey island, Lake Michigan, on Dec. 14, 1900. As the light-house inspector of this district I wish to express to you my appreciation of your courtesy which was of that character always extended by a true sailor and noble nature to those in real distress. It will be my pleasure to bring my courtesy to the attention of the light-house board."

TRADE NOTES.

Lane & DeGroot, Nos. 70-72 Kent street, Brooklyn, N. Y., builders of metallic life boats and rafts, have issued a tasty calendar, the pictorial part of which consists of a reproduction of a drawing of the famous clipper Dreadnaught, whose run from New York to Queenstown in nine days is still the world's record for a sailing ship.

In a quiet way, and as a result of careful attention to details and the interests of its patrons, the Chase Machine Co. of Cleveland has enjoyed a steady increase in business since its affairs were reorganized some time ago. A recent purchase of a piece of ground on Main street running back to the Chase works gives the company about double as much land as they owned formerly. Part of this new ground will be used at once for an addition to the present works, which will give plenty of room for erecting purposes.

The Marine Engine & Machine Co., Newark, N. J., issued a catalogue devoted to their light-draught cabin launches. The company makes a 36-ft. cabin launch drawing 13 in. of water with a 24-in. propeller. The company also makes all varieties of launches which serve as excellent yacht tenders. The prices are extremely reasonable.

Quite a large foreign trade in hollow staybolt iron has been built up lately by the Falls Hollow Staybolt Co. of Cuyahoga Falls, O. This company has lately received many flattering testimonials from the heads of locomotive departments among railway companies, from builders of locomotives and from manufacturers of marine boilers extending compliments upon the high quality of their special grade of hollow staybolt iron.

The Bausch & Lomb Optical Co., Rochester, N. Y., have issued a tasty catalogue upon the subject of their binoculars, which are described as "dwarfs in size but giants in power." Latterly a great demand has arisen for improved glasses for marine work, and those in search of a powerful binocular would do well to inspect the instruments of this company, which are not only of a superior quality but are quite reasonable in price.

Mr. Charles A. Olson of the Crane Co., Chicago, formerly superintendent for the Westinghouse Co. at St. Petersburg, Russia, was a recent visitor at the International Correspondence Schools, Scranton, Pa. Mr. Olson stated that a number of men in his employ in Russia were students of the schools. As instruction is carried on by mail, no difficulty is experienced in teaching students at a distance, and in fact the schools have students in over one hundred foreign countries.

The Sturtevant Engineering Co. has recently moved its London (Eng.) office to 147 Queen Victoria street, that city, in order to secure the increased accommodation necessary for its rapidly growing business as the European representatives of the B. F. Sturtevant Co. of Boston, Mass. A new branch office has been established at 31 Rue de Provence, Paris, and a change made in the location of the Glasgow office to 45 Hope street. The offices at Berlin, Stockholm, Amsterdam and Milan remain the same.

U. S. Engineer Office, Detroit, Mich., Dec. 1, 1900. Sealed proposals will be received here until 12 o'clock noon, standard time, Jan. 3, 1901, and then publicly opened, for furnishing material and labor of all kinds necessary to construct and put in operation one large steel-hulled, self-propelling, seagoing hydraulic dredge, with all necessary appliances complete, including electric light plant, distilling and refrigerating machinery; or the dredge without outfit. Bidders to state time of delivery. Information furnished on application. Thos. H. Handbury, Major, Eng'rs. Dec. 27.

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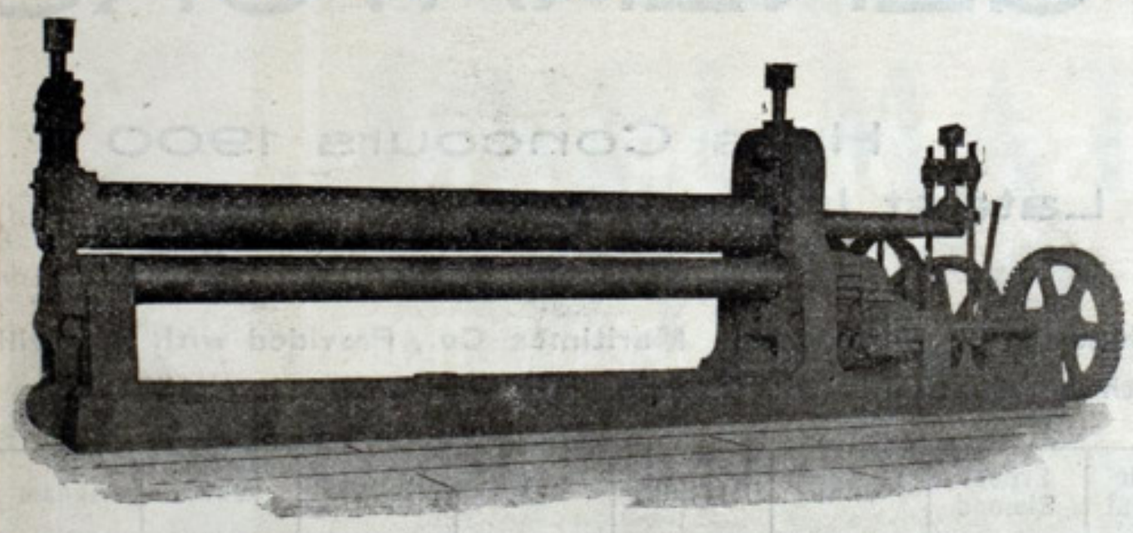

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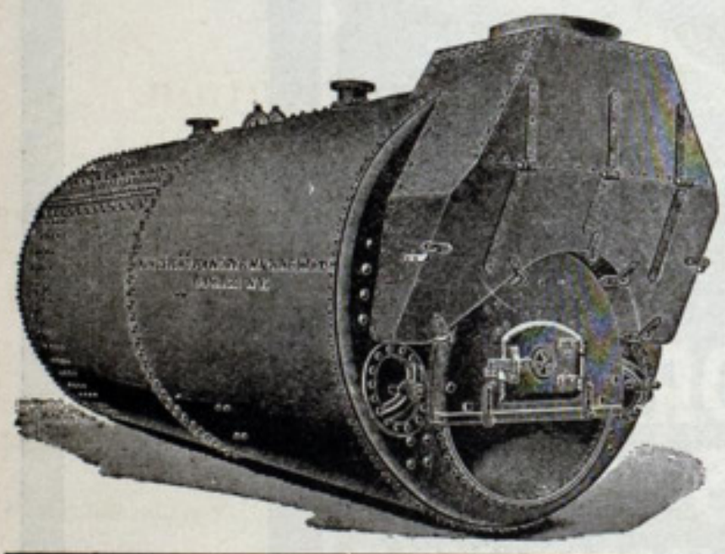

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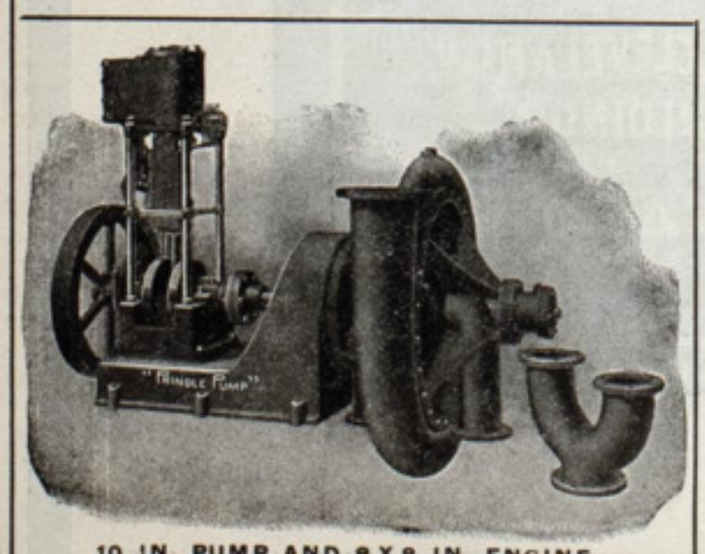

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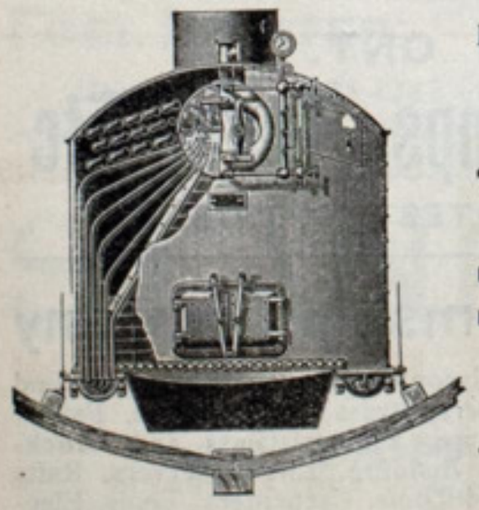

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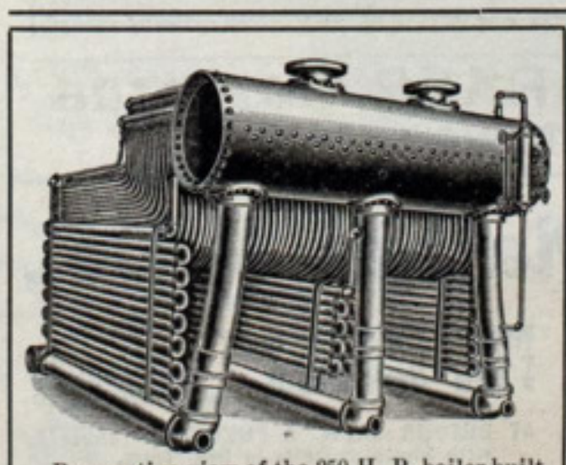

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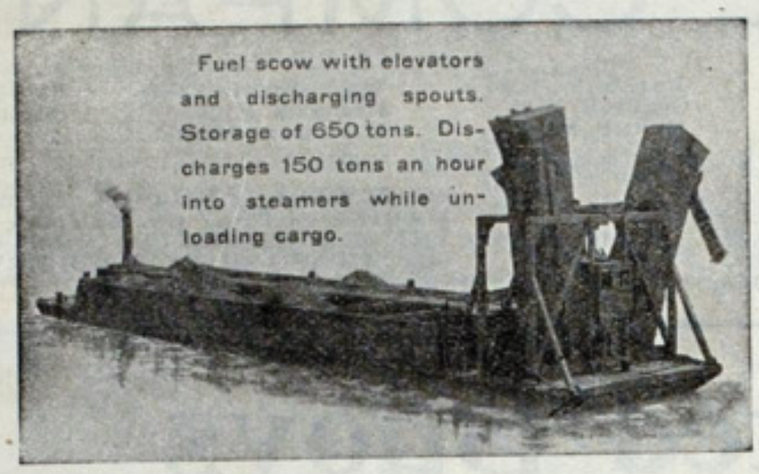

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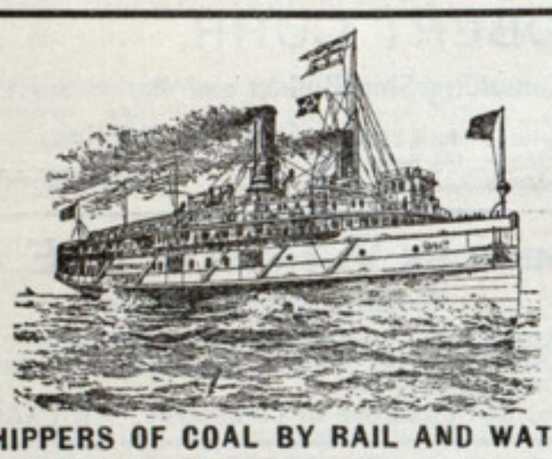

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Neafie & Levy Ship & Engine Bldg. Co.....Philadelphia.
Newport News Ship Building Co.....Newport News, Va.
Nixon, Lewis.....Elizabeth, N. J.
Olds Motor Works.....Detroit.
Pusey & Jones Co.....Wilmington, Del.
Risdon Iron Works.....San Francisco.
Roach's Ship Yard.....Chester, Pa.
Sheriffs Mnfg. Co.....Milwaukee.
Trigg, Wm. R. Co.....Richmond, Va.
Trout, H. G.....Buffalo.
Union Iron Works.....San Francisco.
Willard, Chas. P. & Co.....Chicago.

ENGINE ROOM TELEGRAPH, CALL BELLS, ETC.

Cory, Chas. & Son.....New York.
Electro-Dynamic Co.....Philadelphia.

ENGINEERS, MARINE AND MECHANICAL.

Electro-Dynamic Co.....Philadelphia.
Hunt, Robt. W. & Co.....Chicago.
Miller, Walter.....Cleveland.
Pittsburgh Testing Laboratory, Ltd.....Pittsburg.
Powell, Ambrose V.....Chicago.
See, Horace.....New York.
Wood, W. J.....Chicago.

FANS FOR VENTILATION, EXHAUST, ETC.

Buffalo Forge Co.....Buffalo.
Sturtevant, B. F. Co.....Boston.

FEED WATER PURIFIERS AND HEATERS.

Learmonth, Robert.....Buffalo.
Warren Webster & Co.....Camden, N. J.

FIXTURES FOR LAMPS, OIL AND ELECTRIC.

Page Bros. & Co.....Boston.

FORGES.

Buffalo Forge Co.....Buffalo.
Sturtevant, B. F. Co.....Boston.

FORGINGS, IRON AND STEEL.

Bethlehem Steel Co.....South Bethlehem, Pa.
Bourne-Fuller Co.....Cleveland.
Cleveland City Forge & Iron Co.....Cleveland.

BUYERS' DIRECTORY OF THE MARINE TRADE.—Continued.

FLUSHOMETERS.
Kenney, The Co.....New York.

FURNACES FOR BOILERS.
Continental Iron Works.....New York.

FUELING COMPANIES AND COAL DEALERS.
Castner, Curran & Bullitt (Pocahontas)....Philadelphia.
Graham, James & Co.....Detroit.
Hanna, M. A. & Co.....Cleveland.
Pickands, Mather & Co.....Cleveland.
Pittsburg Coal Co.....Cleveland.
Rochester & Pittsburgh Coal & Iron Co.....Buffalo.
Smith, Stanley B. & Co.....Detroit.
Youghiogheny & Lehigh Coal Co.....Chicago.

GAS BUOYS.
Safety Car Heating & Lighting Co.....New York.

GAS AND GASOLINE ENGINES.
Lake Shore Engine Works.....Marquette, Mich.
McMyler Mnfg. Co.....Cleveland.
Olds Motor Works.....Detroit.

GAGES, STEAM AND VACUUM.
American Steam Gauge Co.....Boston.
Ashton Valve Co.....Boston.
Crosby Steam Gage & Valve Co.....Boston.

GRAPHITE.
Dixon Crucible Co., Joseph.....Jersey City, N. J.

HAMMERS, PNEUMATIC.
Chicago Pneumatic Tool Co.....Chicago.
Cleveland Pneumatic Tool Co.....Cleveland.
Philadelphia Pneumatic Tool Co.....Philadelphia.
Standard Pneumatic Tool Co.....Chicago.

HAMMERS, POWER DROP.
Chase Machine Co.....Cleveland.
Niles Tool Works Co.....Hamilton, O.

HAWSERS, WIRE.
American Steel & Wire Co.....Chicago.

HEATING APPARATUS.
Sturtevant, B. F. Co.....Boston.

HOISTS FOR CARGO, ETC.
American Ship Building Co.....Cleveland.
Brown Hoisting Machinery Co., Incorporated. Cleveland.
Chase Machine Co.....Cleveland.
Elwell-Parker Electric Co.....Cleveland.
General Electric Co.....New York.
Hodge, S. F. & Co.....Detroit.
Hyde Windlass Co.....Bath, Me.
Lidgerwood Mnfg. Co.....New York.
McMyler Mnfg. Co.....Cleveland.
Marine Iron Co.....Bay City.
Westinghouse Electric & Mnfg. Co.....Pittsburg.

INDICATORS FOR STEAM ENGINES.
American Steam Gauge Co.....Boston.
Ashton Valve Co.....Boston.
Crosby Steam Gage & Valve Co.....Boston.

INJECTORS.
Jenkins Bros.....New York.
Penberthy Injector Co.....Detroit.

INSURANCE, MARINE.
Brown & Co.....Buffalo.
Drake & Maytham.....Buffalo.
Elphicke, C. W. & Co.....Chicago.
Gibbs & Joys.....Milwaukee.
Hawgood & Moore.....Cleveland.
Helm, D. T. & Co.....Duluth, Minn.
Hutchinson & Co.....Cleveland.
Keith, J. G. & Co.....Chicago.
La Salle & Co.....Duluth.
Mitchell & Co.....Cleveland.
Osborn, F. H. & Co.....Chicago.
Pauly, H. J.....Milwaukee.
Parker, A. A. & W. B.....Detroit.
Peck, Chas. E. & W. F.....New York and Chicago.
Richardson, W. C.....Cleveland.

IRON ORE AND PIG IRON.
Bourne-Fuller Co.....Cleveland.
Hanna, M. A. & Co.....Cleveland.
Pickands, Mather & Co.....Cleveland.

IRON OR STEEL STAYBOLTS, HOLLOW OR SOLID.
Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

LATHES OF ALL KINDS.
Niles Tool Works Co.....Hamilton, O.

LAUNCHES—NAPHTHA, ELECTRIC.
Gas Engine & Power Co.....New York.

LIFE PRESERVERS, LIFE BOATS, BUOYS, RAFTS, ETC.
Armstrong Cork Co.....Pittsburg.
Drein, Thos. & Son.....Wilmington, Del.
Kahnweiler's Sons, D.....New York.
Lane & DeGroot.....Brooklyn.

LIGHTS, SIDE AND SIGNAL.
Page Bros. & Co.....Boston.

LOGS.
Walker & Son, Thomas.....Birmingham, Eng.
Also Ship Chandlers.

MACHINE TOOLS.
Niles Tool Works Co.....Hamilton, O.

MACHINE TOOLS (WOOD WORKING).
Fay & Egan Co., J. A.....Cincinnati, O.
Atlantic Works, Inc.....Philadelphia.

MARINE RAILWAYS, BUILDERS OF
Crandall & Son, H. I.....East Boston, Mass.

MATTRESSES, CUSHIONS, BEDDING.
Fogg, M. W.....New York.

MECHANICAL DRAFT FOR BOILERS.
American Ship Building Co.....Cleveland.
Bloomsburg & Co., H.....Newport News, Va.
Buffalo Forge Co.....Buffalo.
Detroit Shipbuilding Co.....Detroit.
Sturtevant, B. F. Co.....Boston.

METALLIC PACKING.
Katzenstein, L. & Co.....New York.
U. S. Metallic Packing Co.....Philadelphia.

METALS FOR BEARINGS.
Cramp, Wm. & Sons.....Philadelphia.
Phosphor Bronze Smelting Co., Ltd.....Philadelphia.

METAL POLISH.
Bertram's Oil Polish Co.....Boston, Mass.

MILLING MACHINES OF ALL KINDS.
Niles Tools Works Co.....Hamilton, O.

NAUTICAL INSTRUMENTS.
Bliss, John & Co.....New York.
Ritchie, E. S. & Sons.....Brookline, Mass.

NAVAL ARCHITECTS.
Curr, Robert.....Cleveland.
See, Horace.....New York.
Wood, W. J.....Chicago.

NICKEL STEEL FORGINGS.
Bethlehem Steel Co.....South Bethlehem, Pa.

OAKUM.
Stratford Oakum Co., Geo.....Jersey City, N. J.

OILS AND LUBRICANTS.
Dixon Crucible Co., Joseph.....Jersey City, N. J.
Standard Oil Co.....Cleveland.

PACKING.
Jenkins Bros.....New York.
Katzenstein, L. & Co.....New York.
U. S. Metallic Packing Co.....Philadelphia.

PAINTS.
Baker, Howard H. & Co.....Buffalo.
Smith, Edward & Co.....New York.
Upson-Walton Co.....Cleveland.

PAINTING MACHINES, PNEUMATIC.
Chicago Pneumatic Tool Co.....Chicago.

PATENT ATTORNEYS.
Thurston & Bates.....Cleveland.

PATTERN SHOP MACHINERY.
Fay & Egan Co., J. A.....Cincinnati, O.
Atlantic Works, Inc.....Philadelphia.

PIPE, WROUGHT IRON.
Bourne-Fuller Co.....Cleveland.

PLANERS OF ALL KINDS.
Niles Tool Works Co.....Hamilton, O.

PLANING MILL MACHINERY.
Fay & Egan Co., J. A.....Cincinnati, O.
Atlantic Works, Inc.....Philadelphia.

PLUMBING, MARINE.
Ellis Marine Plumbing Co.....New York.
Mott Iron Works, J. L.....New York.
Sands, Alfred B. & Son.....New York.
Kenney, The Co.....New York.

PNEUMATIC TOOLS.
Chicago Pneumatic Tool Co.....Chicago.
Cleveland Pneumatic Tool Co.....Cleveland.
Philadelphia Pneumatic Tool Co.....Philadelphia.
Standard Pneumatic Tool Co.....Chicago.

POLISH FOR METALS.
Bertram's Oil Polish Co.....Boston.

PROPELLER WHEELS.
American Ship Building Co.....Cleveland.
Atlantic Works.....East Boston, Mass.
Bath Iron Works, Ltd.....Bath, Me.
Cramp, Wm. & Sons.....Philadelphia.
Detroit Shipbuilding Co.....Detroit.
Farrar & Trefts.....Buffalo.
Fore River Engine Co.....Weymouth, Mass.
Hardy, John B.....Tacoma, Wash.
Hyde Windlass Co.....Bath, Me.
Harlan & Hollingsworth Co.....Wilmington, Del.
Hodge, S. F. & Co.....Detroit.
Jenks Ship Building Co.....Port Huron, Mich.
Lockwood Mnfg. Co.....East Boston, Mass.
MacKinnon Mfg. Co.....Bay City, Mich.
Maryland Steel Co.....Sparrow's Point, Md.
Moran Bros. Co.....Seattle, Wash.
Morse Iron Works & Dry Dock Co.....Brooklyn.
Neafie & Levy Ship & Engine Bldg. Co.....Philadelphia.
Newport News Ship Building Co.....Newport News, Va.
Nixon, Lewis.....Elizabeth, N. J.
Phosphor Bronze Smelting Co., Ltd.....Philadelphia.
Pusey & Jones Co.....Wilmington, Del.
Risdon Iron Works.....San Francisco.
Sheriffs Mnfg. Co.....Milwaukee.
Trigg, Wm. R. Co.....Richmond, Va.
Trout, H. G.....Buffalo.
Union Iron Works.....San Francisco.

PROJECTORS, ELECTRIC.
Elwell-Parker Electric Co.....Cleveland.
General Electric Co.....Schenectady, N. Y.
Rushmore Dynamo Works.....Jersey City, N. J.
Westinghouse Electric & Mnfg. Co.....Pittsburg.

PUMPS FOR VARIOUS PURPOSES.
Blake, Geo. F. Mnfg. Co.....New York.
Davidson, M. T.....Brooklyn, N. Y.
Kingsford Foundry & Machine Works....Oswego, N. Y.
Wood, R. D. & Co.....Philadelphia.
Worthington, Henry R.....New York.

PUNCHES, RIVETERS, SHEARS.
Cleveland Punch & Shear Works Co.....Cleveland.
New Doty Mnfg. Co.....Janesville, Wis.
Niles Tool Works Co.....Hamilton, O.
Wood, R. D. & Co.....Philadelphia.

REGISTER FOR CLASSIFICATION OF VESSELS.
Great Lakes Register.....Cleveland.

RELEASING HOOKS FOR DETACHING BOATS.
Standard Automatic Releasing Hook Co.....New York.

RIVETS, STEEL, FOR SHIPS AND BOILERS.
Bourne-Fuller Co.....Cleveland.
Champion Rivet Co.....Cleveland.

RIGGING ROPE (WIRE).
American Steel & Wire Co.....Chicago.

RUBBER INSULATED WIRES.
Roebling's Sons, John A.....New York and Cleveland.
American Steel & Wire Co.....Chicago.

SAFETY VALVES.
American Steam Gauge Co.....Boston.
Ashton Valve Co.....Boston.
Crosby Steam Gage & Valve Co.....Boston.

SAIL MAKERS.
Baker, Howard H. & Co.....Buffalo.
Upson-Walton Co.....Cleveland.
Wilson & Silsby.....Boston.

SALVAGE COMPANIES.
See wrecking companies.

SCHOOLS, CORRESPONDENCE—ENGINEERING AND NAVIGATION.
American School of Correspondence.....Boston.
Buffalo Nautical School.....Buffalo.
Chicago Nautical School.....Chicago.

SCREW MACHINES.
Niles Tool Works Co.....Hamilton, O.

SEARCH LIGHTS.
Elwell-Parker Electric Co.....Cleveland.
General Electric Co.....Schenectady, N. Y.
Rushmore Dynamo Works.....Jersey City, N. J.
Westinghouse Electric & Mnfg. Co.....Pittsburg.

SHAPERS.
Niles Tool Works Co.....Hamilton, O.

SHEARS.
See punches, riveters and shears.

SHIP AND BOILER PLATES AND SHAPES.
Bourne-Fuller Co.....Cleveland.

SHIP BUILDERS.
American Ship Building Co.....Cleveland.
Atlantic Works.....East Boston, Mass.
Bath Iron Works, Ltd.....Bath, Me.
Buffalo Dry Dock Co.....Buffalo.
Cramp, Wm. & Sons.....Philadelphia.
Craig Ship Building Co.....Toledo, O.
Chicago Ship Building Co.....Chicago.
Detroit Shipbuilding Co.....Detroit.
Fore River Engine Co.....Weymouth, Mass.
Hardy, John B.....Tacoma, Wash.
Harlan & Hollingsworth Co.....Wilmington, Del.
Jenks Ship Building Co.....Port Huron, Mich.
Lockwood Mnfg. Co.....East Boston, Mass.
Maryland Steel Co.....Sparrow's Point, Md.
Moran Bros. Co.....Seattle, Wash.
Morse Iron Works & Dry Dock Co.....Brooklyn.
Neafie & Levy Ship & Engine Bldg. Co.....Philadelphia.
Newport News Ship Building Co.....Newport News, Va.
Nixon, Lewis.....Elizabeth, N. J.
Pusey & Jones Co.....Wilmington, Del.
Risdon Iron Works.....San Francisco.
Roach's Ship Yard.....Chester, Pa.
Townsend & Downey Ship Bldg. Co.....New York.
Trigg, Wm. R. Co.....Richmond, Va.
Union Dry Dock Co.....Buffalo.
Union Iron Works.....San Francisco.
Willard, Chas. P. & Co.....Chicago.

SHIP CHANDLERS.
Baker, Howard H. & Co.....Buffalo.
Moran Bros. Co.....Seattle, Wash.
Upson-Walton Co.....Cleveland.

SPARS—LARGE SIZES.
Moran Bros. Co.....Seattle, Wash.

STAYBOLTS, IRON OR STEEL, HOLLOW OR SOLID.
Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

STEAM VESSEL FOR SALE.
Holmes, Samuel.....New York.

STEEL OR IRON STAYBOLTS, HOLLOW OR SOLID.
Falls Hollow Staybolt Co.....Cuyahoga Falls

BUYERS' DIRECTORY OF THE MARINE TRADE.—Continued.

STEAMSHIP LINES, PASS. AND FREIGHT.
American Line.....New York.
Erie & Western Trans. Co.....Buffalo.
International Nav. Co.....Philadelphia.
Red Star Line.....New York.

STEEL SHAFTS, SOLID OR HOLLOW.
Bethlehem Steel Co.....South Bethlehem, Pa.

STEERING APPARATUS.
American Ship Building Co.....Cleveland.
Chase Machine Co.....Cleveland.
Detroit Shipbuilding Co.....Detroit.
Electro-Dynamic Co.....Philadelphia.
Hyde Windlass Co.....Bath, Me.
Jenks Ship Building Co.....Port Huron, Mich.
Queen City Engineering Co.....Buffalo.
Sheriffs Mnfg. Co.....Milwaukee.

STOCKS, BONDS, SECURITIES.
Wright, Herbert & Co.....Cleveland.

STOCKLESS ANCHORS.
Baldt Anchor Co.....Chester, Pa.
International Anchor Co.....Cleveland.

STRUCTURES OF STEEL, BUILDERS OF.
American Bridge Co.....New York.

SURVEYORS, MARINE.
Curr, Robert.....Cleveland.
Gibbs & Joys.....Milwaukee.

TELEGRAPH—DECK AND ENGINE ROOM.
Cory, Chas. & Son.....New York.

TESTS OF MATERIAL.
Hunt, Robert W. & Co.....Chicago.
Pittsburgh Testing Laboratory, Ltd.....Pittsburg.

THERMOMETERS FOR MECHANICAL PURPOSES.
Helios-Upton Co.....Peabody, Mass.

TIMBER—LARGE PIECES.
Moran Bros. Co.....Seattle, Wash.

TOOLS, METAL WORKING, FOR SHIP AND ENGINE WORKS.
Chicago Pneumatic Tool Co.....Chicago.
Cleveland Pneumatic Tool Co.....Cleveland.
Cleveland Punch & Shear Works Co.....Cleveland.
New Doty Mnfg. Co.....Janesville, Wis.
Niles Tool Works Co.....Hamilton, O.
Philadelphia Pneumatic Tool Co.....Philadelphia.
Standard Pneumatic Tool Co.....Chicago.
Wood, R. D. & Co.....Philadelphia.

TOOLS, WOOD WORKING.
Fay & Egan Co., J. A.....Cincinnati, O.
Atlantic Works, Inc.....Philadelphia.

TRUCKS.
Boston & Lockport Block Co.....Boston.

TOWING MACHINES.
American Ship Windlass Co.....Providence, R. I.
Chase Machine Co.....Cleveland.
Playfair's Barge & Tug Line.....Midland, Ont.

TOWING COMPANIES.
Donnelly Salvage & Wrecking Co.....Kingston, Ont.
Swain Wrecking Co.....Detroit.

TUBING FOR BOILERS.
Shelby Steel Tube Co.....Cleveland.

VALVES, STEAM SPECIALTIES, ETC.
American Steam Gauge Co.....Boston.
Ashton Valve Co.....Boston.
Crosby Steam Gage & Valve Co.....Boston.
Jenkins Bros.....New York.

VARNISH MAKERS, COLOR GRINDERS, ETC.
Smith, Edward & Co.....New York.

VARNISH PAINT.
Mair, John & Son.....Philadelphia.

VESSEL AND FREIGHT AGENTS.
Boland, John J.....Buffalo.
Brown & Co.....Buffalo.
Drake & Maytham.....Buffalo.
Elphicke, C. W. & Co.....Chicago.
Gibbs & Joys.....Milwaukee.
Hall & Root.....Buffalo.
Hawgood & Moore.....Cleveland.
Helm, D. T. & Co.....Duluth, Minn.
Holmes, Samuel.....New York.
Hutchinson & Co.....Cleveland.
Keith, J. G. & Co.....Chicago.
Mitchell & Co.....Cleveland.
Moffat & O'Brien.....San Francisco.
Pauly, H. J.....Milwaukee.
Richardson, W. C.....Cleveland.

VENTILATING APPARATUS FOR SHIPS.
Buffalo Forge Co.....Buffalo.
Sturtevant, B. F. Co.....Boston.

WIRE ROPE AND WIRE ROPE FITTINGS.
American Steel & Wire Co.....Chicago.
Baker, H. H. & Co.....Buffalo.
Roebling's Sons, John A.....New York and Cleveland.
Upson-Walton Co.....Cleveland.

WHISTLES, STEAM.
American Steam Gauge Co.....Boston.
Ashton Valve Co.....Boston.
Crosby Steam Gage & Valve Co.....Boston.
Signal & Control Co.....New York.

WINDLASSES.
American Ship Windlass Co.....Providence, R. I.
American Ship Building Co.....Cleveland.
Hyde Windlass Co.....Bath, Me.
Jenks Ship Building Co.....Port Huron, Mich.

WINCHES.
American Ship Windlass Co.....Providence, R. I.
Hyde Windlass Co.....Bath, Me.

WOOD WORKING MACHINERY.
Fay & Egan Co., J. A.....Cincinnati, O.
Atlantic Works, Inc.....Philadelphia.

WORM GEARING.
Morse, Williams & Co.....Philadelphia.

WRECKING AND SALVAGE COMPANIES.
Donnelly Salvage & Wrecking Co.....Kingston, Ont.
Playfair's Barge & Tug Line.....Midland, Ont.
Swain Wrecking Co.....Detroit.

YACHT SAILS, FITTINGS, HARDWARE, ETC.
Wilson & Silsby.....Boston.

YACHT AND BOAT BUILDERS.
Drein, Thos. & Son.....Wilmington, Del.
Gas Engine & Power Co.....New York.
Lane & DeGroot.....Brooklyn.
Willard, Chas. P. & Co.....Chicago.

YAWLS.
Drein, Thos. & Son.....Wilmington, Del.
Lane & DeGroot.....Brooklyn.

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Pittsburgh Testing Laboratory, Ltd. 34
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Pusey & Jones Co. 5

Queen City Engineering Co. 10

Red Star Line. 7
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LAKE SHORE & MICHIGAN SOUTHERN RAILWAY.

CLEVELAND CITY TICKET OFFICE,
237 SUPERIOR STREET.

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No. 18, Southwestern Limited	.....	*1 55 am
No. 22, Lake Shore Limited	*2 15 am	*2 20 am
No. 28, New York & Boston Express	*7 40 am	*8 00 am
No. 32, Fast Mail	*11 25 am	*11 30 am
No. 44, Accommodation, via Sandusky	†1 25 pm	.....
No. 46, Southwestern Express	.....	*3 00 pm
No. 6, Limited Fast Mail	*5 40 pm	*5 45 pm
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No. 16, New England Express	*10 30 pm	*10 35 pm
No. 2, Day Express	†9 05 pm	†9 20 pm
No. 26, Night Express	*7 30 am	.....
No. 126, Norwalk Accommodation	†8 40 am	.....
No. 40, Toledo & Buffalo Accom., via Norwalk.	†10 00 am	†10 30 am
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Westward:—	**Ar. fr. East.**	**Dep. West.**
No. 11, Southwestern Limited	*3 25 am	.....
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No. 47, Accommodation	.....	†3 00 pm
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No. 127, Norwalk Accommodation	.....	†5 10 pm
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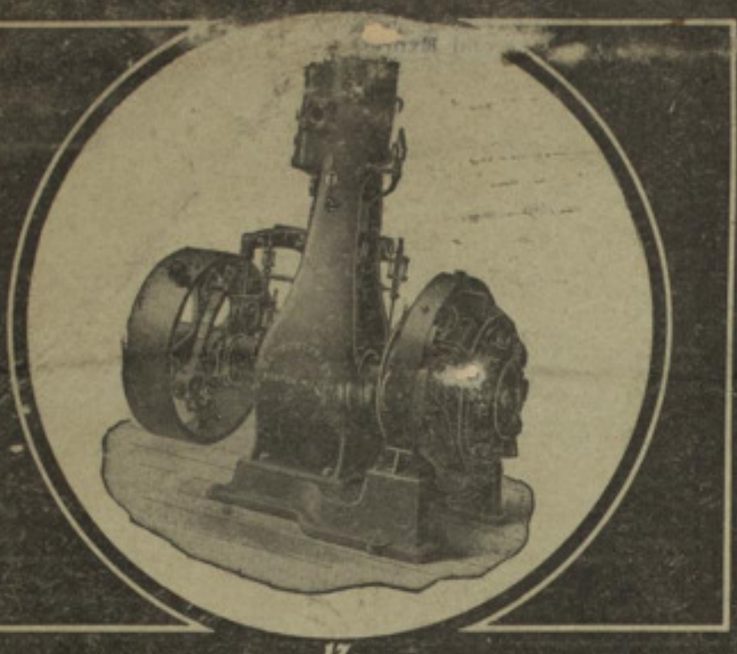

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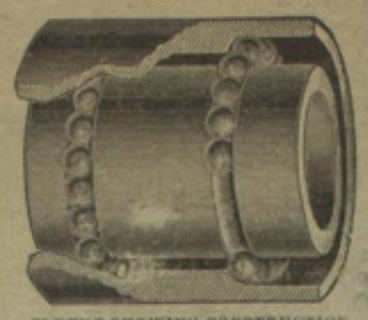

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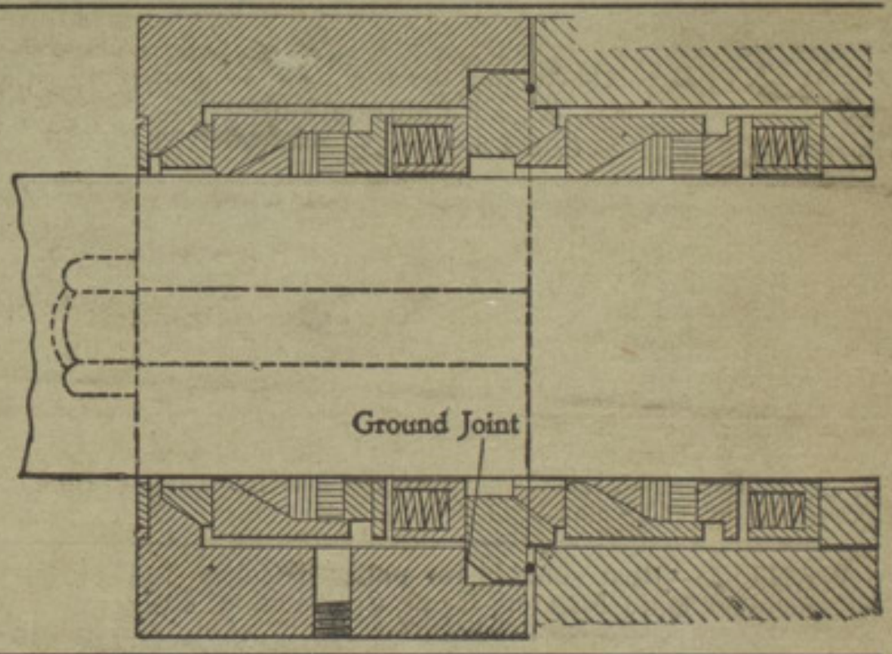

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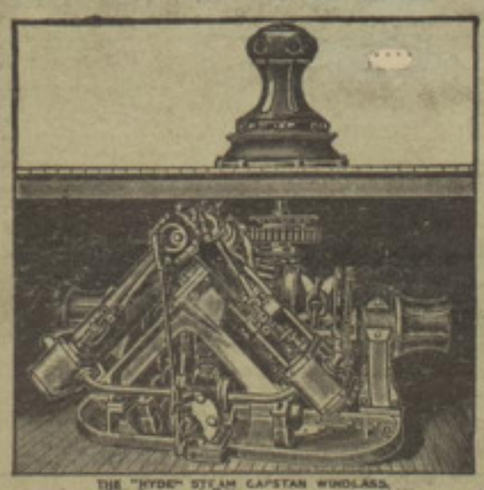

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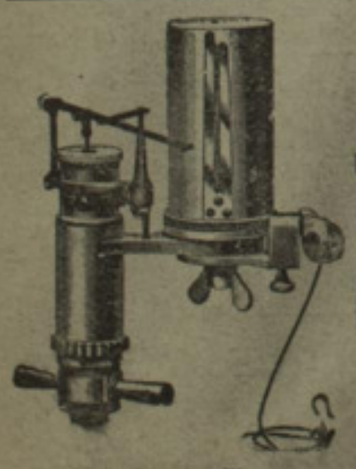

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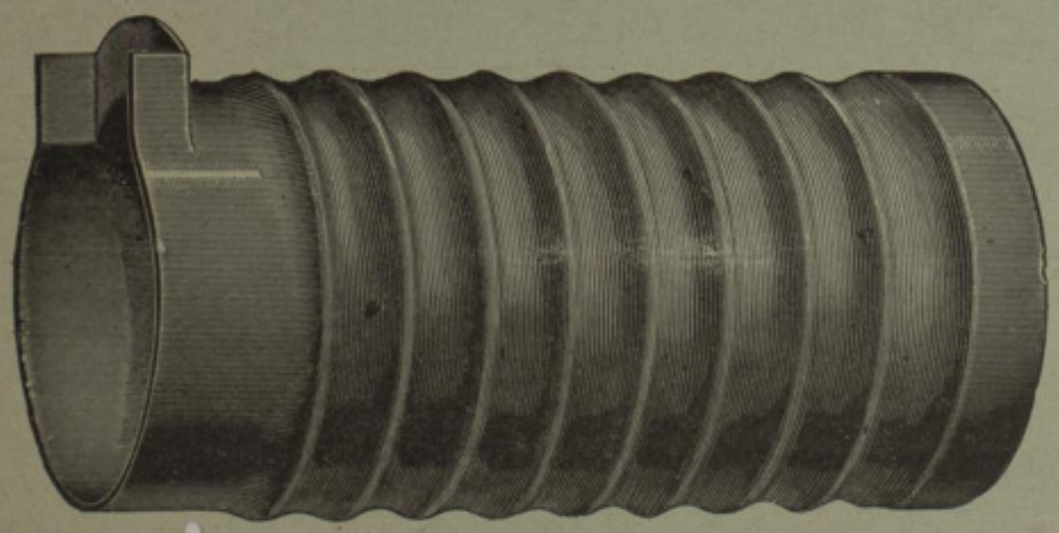

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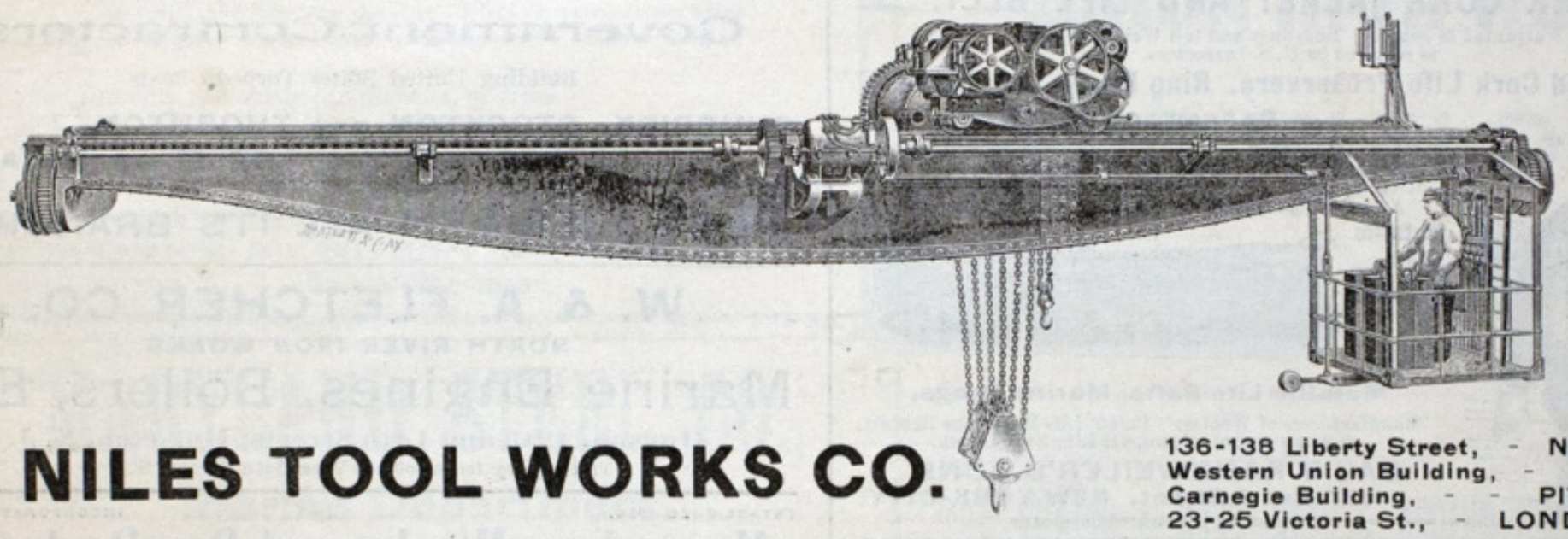

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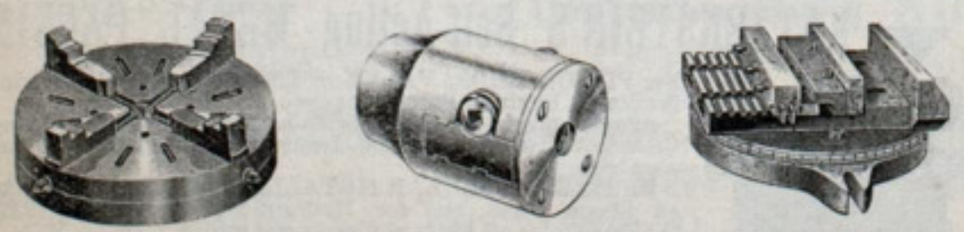

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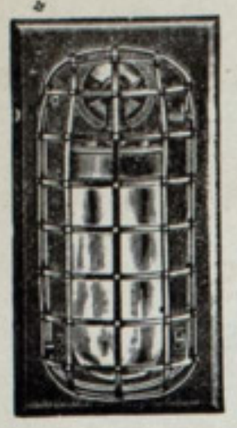

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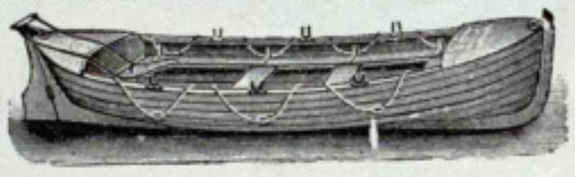

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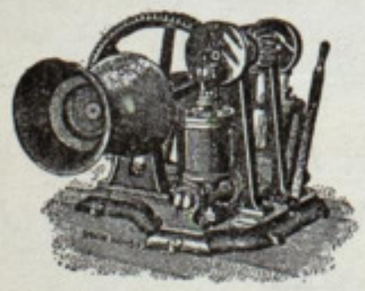

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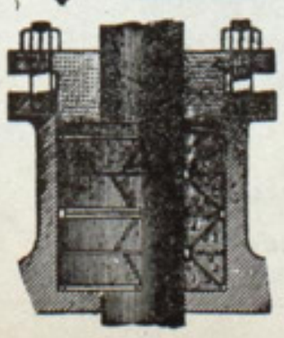

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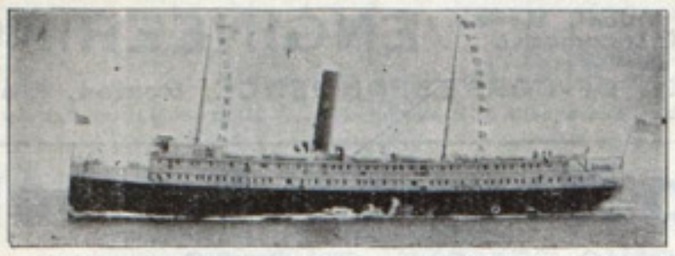

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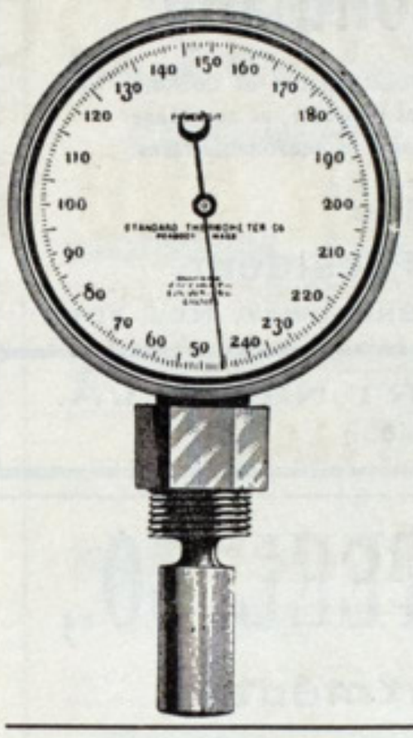

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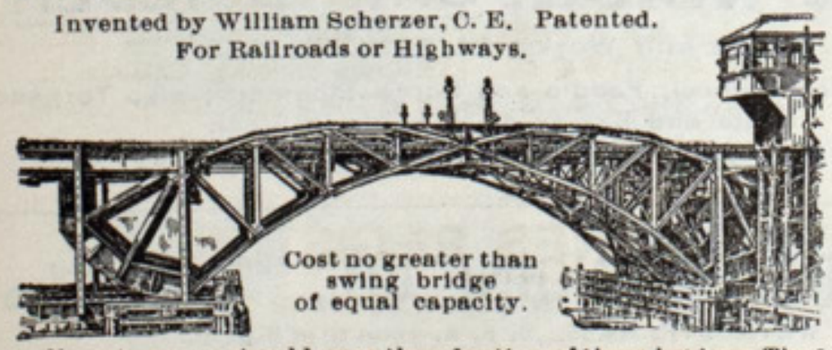

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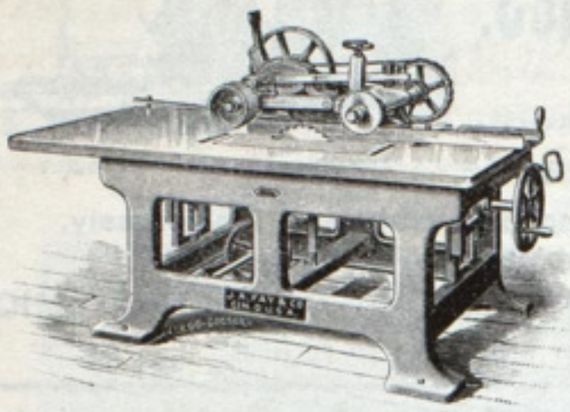

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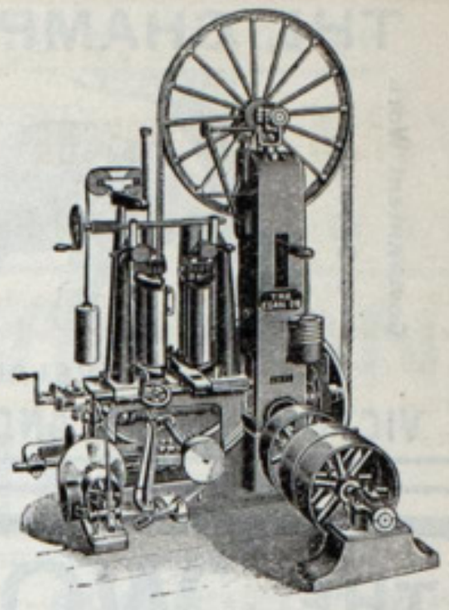

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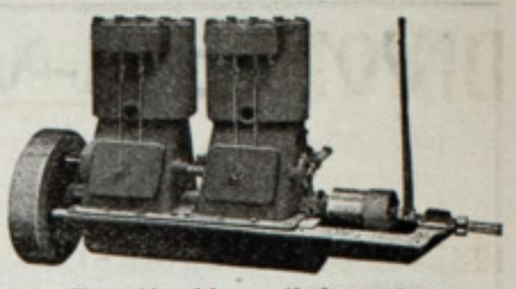

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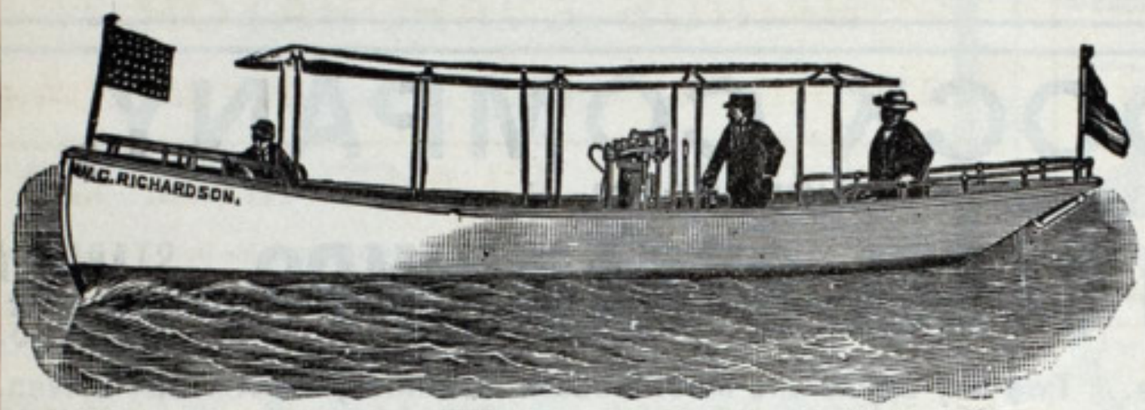

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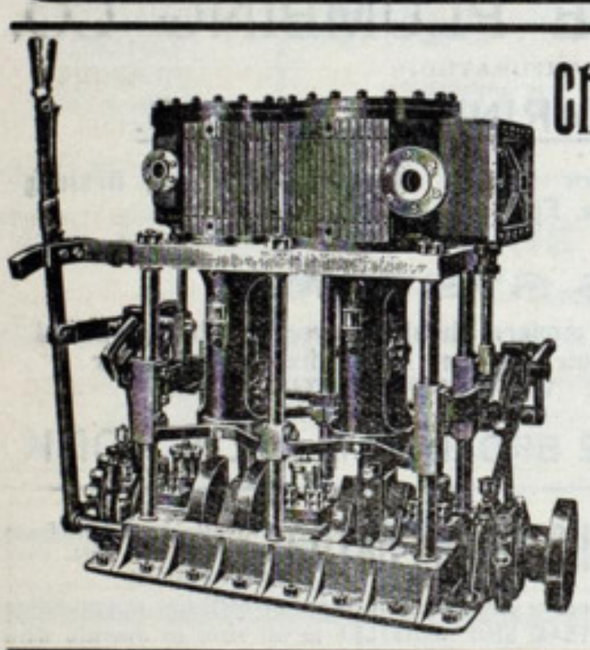

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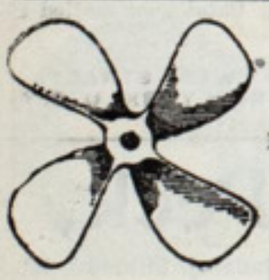

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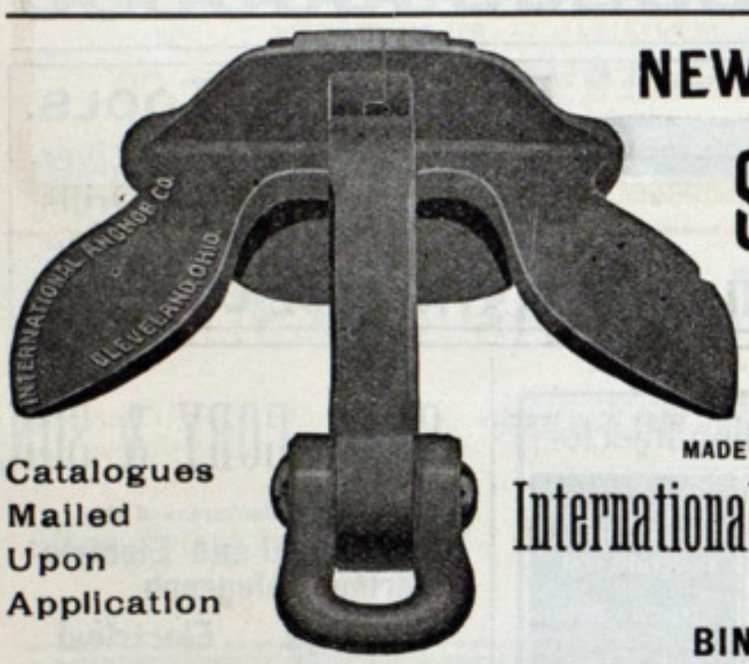

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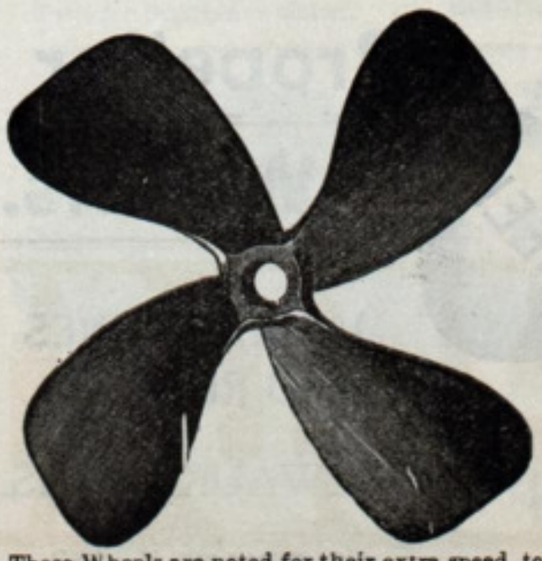

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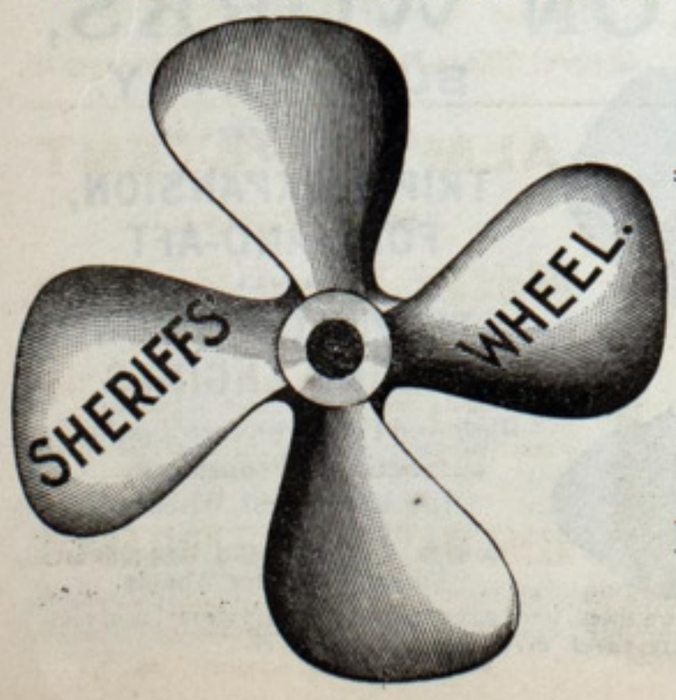

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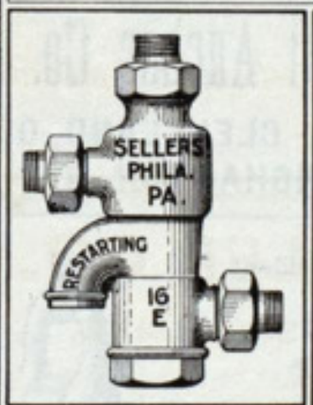

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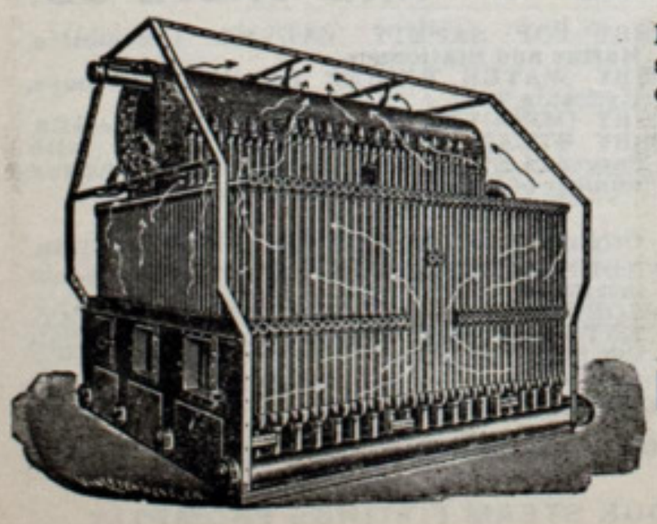

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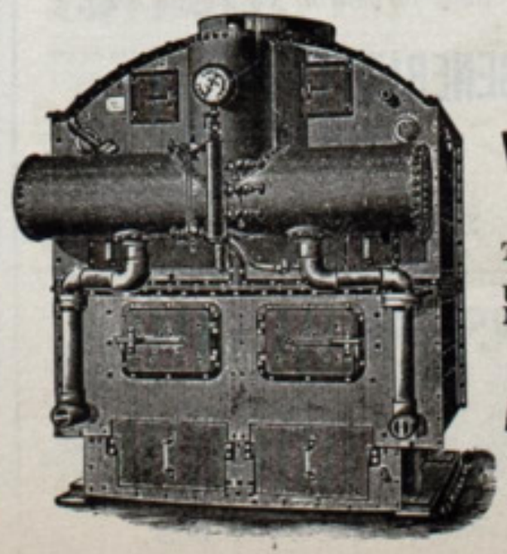

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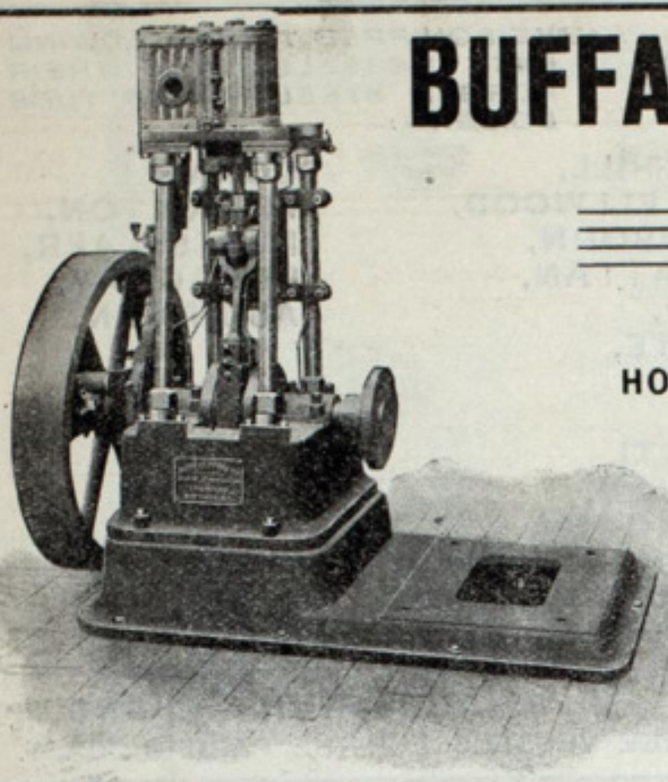

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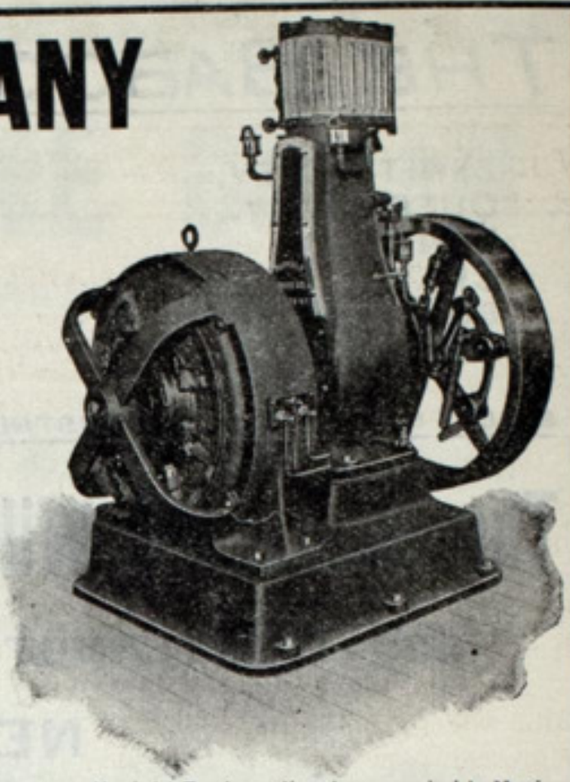

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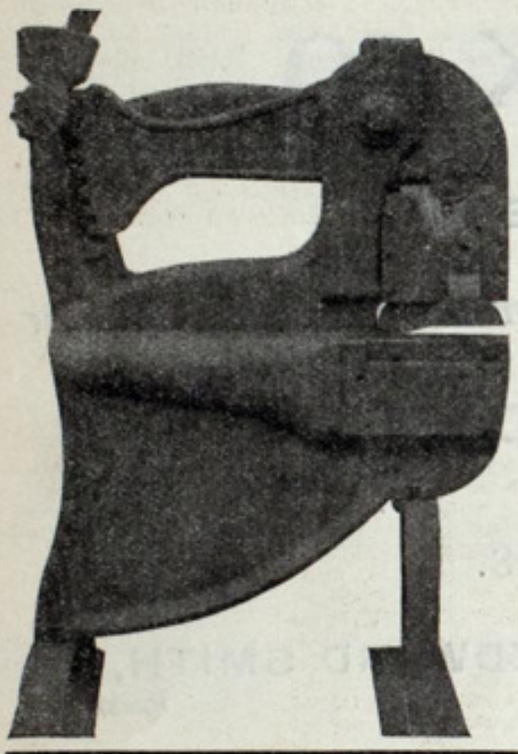

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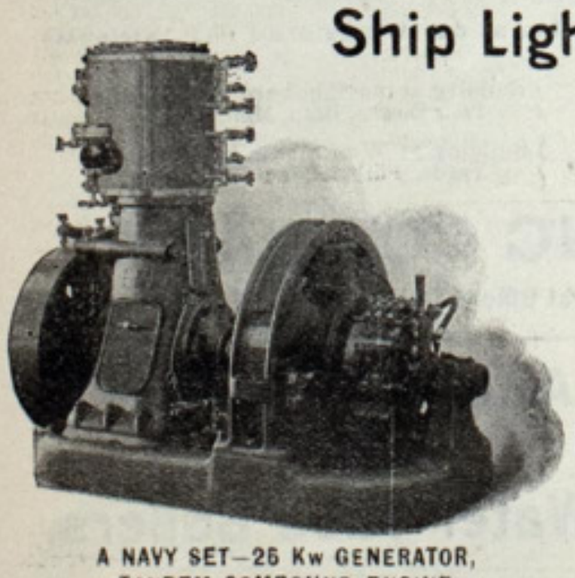

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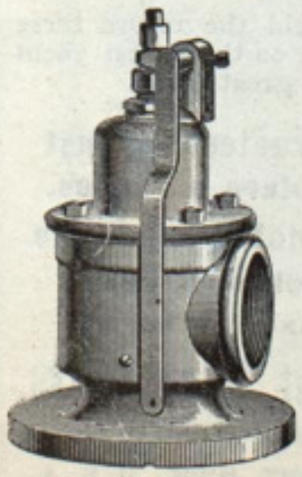

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